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DOCKETS

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**Response To : Waiver Petition Docket FRA 2002-12113** -5

The Union Pacific Railroad (UP) and The National Railroad Passenger Corporation (Amtrak) seek a waiver of compliance from such sections of Parts 211, 216, 217, 218, 229, 233, 235, 236, 240, of Title 49 CFR, in order to develop, test and implement a program referred to as "Positive Train Control (PTC)", to protect against train collisions, over speed violations, and to protect track maintenance personnel from trains.

The material which follows focuses on high lights, for emphasis, and is not intended to be all inclusive; nor a line by line critique of the Federal Register Notice of Tuesday, July 30, 2002 , 67FR47382 to 67FR 49386, inclusive.

The Docket raises two serious ethical questions. Has the Federal Railroad Administration (FRA) lost its way?? Does the Federal Railroad Administration have the appearance of perpetrating a fraud on the Public??

That which follows is broken down in several sections, as follows:

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**Overview:**

**Prior:**

The Docket FRA 2002-12113 looks somewhat similar to that previously issued by the FRA a few years ago, to support the trials searching to find a solution to the "vision" of "Communications Based Train Control" in the joint corridor of the Union Pacific and Burlington Northern in the Pacific North West.

The Docket was submitted incorporates the same tactical error as the earlier effort, in this case, granting blanket relief from data and information reporting and record keeping. For the earlier effort, nothing has been published, and had to be satisfied, as they reported: "...However, it was also apparent that the railroad industry was not persuaded that such technology represented a sound investment in light of other capital needs..." (66FR42378).

**Dockets Ignored:**

Reaching back to the earlier request for waivers, in order to implement a test program, on the UP-BN joint territory, the Federal Railroad Administration were in receipt of only four individual Docket Responses; all of which protested the "relief" or "waivers" that the FRA elected to grant; **in essence, the FRA ignored the rationale of all four of the Docket Responses in that matter.**

**Funding Squandered:**

In the earlier UP-BN endeavor, the FRA essentially only distributed tax payers dollars, to cover Amtrak locomotive expenses to retrofit for the test program; however, the FRA coerced each railroad to budget nine million each to implement the test program (which in each case, was "overrun").

For emphasis, it is to be noted that the FRA was spending someone else's resources in quest of the "vision".

## Overview:

The FRA appear to have lost their way; both from a perception of a "political". "Safety" "Time Duration" and "Position of Others".

### Political:

As "cheer leaders" and now the major funding source, the FRA are now in the position of redistribution of taxpayer's dollars; yet in the various "waivers" expected to be granted as indicated in their current Docket; they have destroyed both the "record" of what the funding has wrought; but also, any trail to allocate responsibility.

The very way the FRA **have given away the store, is in sharp contrast** with the current political theme of holding specific individuals accountable, under oath, and penalties for any dereliction of duty (Security Exchange Commission rules now applicable to Chief Executive Officers).

Now treaded throughout all the various FRA Rules and Regulations (Parts), they have established an elaborate tables of "Schedules of Civil Penalties" (Which over time, have increased in amounts; both individual items, as well as added items). Now if this Docket, as it is proposed to granting in excess of fifty rules, nothing is said about the massive listing of the many field penalties **which are in effect for others** as contrasted with the blatant freedom granted to the NAJPTCP participants.

The Docket is requesting in excess of fifty waivers for compliance of existing Rules of the FRA, gives no inkle of the fact; that if the "vision" sought by the NAJPTCP were attempted to be implemented, a majority of the waivers would have to become permanent waivers. In that regard, the very nature of the NAJPTCP has inherent flaws in respect to its attempt to "reinvent the wheel" -- Just two of the items, to make a point, come to mind, such as requests for waivers for Sections 236.5 and 236.511. For example, Section 236.5 calls for signal control circuits to be in a closed circuit principle: but **in no way** can the NAJPTCP comply; particularly as it states: **"Justification, PTC is composed of solid-state components that are software driven. Neither the hardware nor software can technically be designed to meet the provisions of this section."** (67FR49384)

Now both sections 236.5 and 236.511 each individually, as indicated in Appendix A of Part 236 "Civil Penalties", each carry a designated \$ 1,000 fine, and for "Willful Violations" a fine of \$ 2,000. Now as a major portion of the fifty plus waivers requested, would have to be provided as permanent, to implement a project predicated upon the NAJPTCP concepts, we are faced with the myriad of civil penalties associated with each rule. Does this mean we will establish an **"elite class" of employees, immune from the FRA.s threat of civil penalties???**

As to the realm of "Civil Penalties", is the parallel issue of liability.. As to Liability, the FRA are comfortable in both their position of "Federal Supremacy", as well as their published positions in their Rule making relative to "Processor Based Signal and Train Control Systems", in reaching into the future have defined and stated, for facilities and systems, that are not yet in existence,, have gone so far as to state in their discussion: "... in essence, the proposed requirements would impose a strict liability standard on the railroad regardless of culpability..."(10 August 2001, 66FR42363).

### **Safety:**

Alan Polivka, General Manager NAJPTC Project, and Assistant Vice President of Communications and Train Control Technologies , Transportation Technology Center, Inc. (TTCI), in his recent published article in the International Railway Journal (See exhibit attached to "Attachment III of supporting "information package", included as part of this docket response), goes on to state: "...Communications Based Train Control (CBTC) systems will **improve safety**...firstly in improved primarily by increasing higher notification coverage through automatic onboard warnings and/or enforcement to avoid collisions, to prevent excess speed, and to protect track workers...."

As to improved safety one might start with FRA's declaration (previously mentioned) concerning section 236.5 where it was stated in part: "...Neither the hardware nor software can technically be designed to meet the provisions of this portion.." and realize the number of steps in the circular route from "reality" to the enginman. For both the vehicle as well as wayside units, status intelligence must employ computer power to translate status data into digital format to be transmitted to the "control server". The incoming traffic must be decoded and prioritized at the central site as an input to the central server, to work its way through the central server, again translated into digital intelligence to a communications link via a, to what ever radio base station is known to have the specific locomotive in its range, then upon receipt, again computer power to know of message is for that specific vehicle, after which to convert the digital protocol back to what has to be done. Not to be over looked, as part of the NAJPTCP process are such computer and software associated with the Location Determination System (LDS) ( with its "patch" to significantly improve performance of the "inertial sensors aboard the locomotive). Now this tour around the county side, is dependent upon each and every step in a "serial sequence" and all on a "contention basis".

Had enough?? How about precise knowledge of one's "end of train device" ?? Then is suggested one read Attachment II of the enclosed "support package" related to the NAJPTCP's

gift to a "Plaintiff's Attorney".

As an unexpected consequence of the prolific quantity of waivers the FRA propose, is that in exempting the collection of data, one robs the possibility of acquiring useful information upon which to base the current infatuation with such concepts as "Risk Analysis" and/or "Mean Time before failure". The FRA, in fact take the opposite position, in actually wanting to **hide information under a bushel**, as they state in the justification for waiver of section 229.135 relative to event recorders, they state in part: "...Such data can be expected **to contain abomalies that do not reflect the operational conditions** but by analysis will contribute to achieving necessary objectives in the PTC design..." (67FR49383)

To keep the project in "low key", the FRA request exemption from their section 236.15 relative to "Time table Instructions" and justify the request, in part, as they state: "...Specifying the test territory in the Time Table as would be both premature and un-necessary paper work burden..." (67<sup>4</sup>9384). Hey guys! There is something missing here --- If one<sup>FA</sup> is going out on a section of Railroad under Absolute Block, what of the need to establish restraint or a "block" against all other trains that otherwise would have "rights" to operate in the affected territory, in such manner as appropriate, for what ever means and operating rules applicable to the area??

#### **Time Extension:**

That the FRA propose to grant a two year period extension of time to August 30, 2004, is a severe blow to the entire creditability of the NAJPTCP project, in that, in not completing the project during the past five years of effort, and needing two more years to satisfy Alan Polivka's statement: "...we are not there yet..." in combination with continued delays to say "patch" software, all told raises questions of possible integrity and simplicity of the end product.

Firstly, the FRA Docket states at the end of the two year period, in part: "...A high speed demonstration run will be undertaken in the test territory. This Demonstration will allow Railroad, Government and Contractor Officials the opportunity to witness the operation of the PTC system.." (67FR49383) (Very funny --- to thread **one train at a time** through a process is too simplistic, as there is no challenge to "congestion" and handling of conflicting and interference, et all --Will there be a demonstration of elapsed time to reach the locomotive when a signal is dropped in his face. etc.?? most experienced people know, over the years, and various generations of hardware and operating systems, that to run a "single" program through a "man frame" at times can be successful; however, to run and

mix the new program at the same time as other proven programs, can result in the new addition to "bomb out" and even cause a main frame "crash". Over all, a single run of a single unit, for example, would not prove "operatability" nor function in different environments (either by territory characteristics and/or weather influence).

Secondly, as there is now a proposed two year extension, will the original funding be adequate, and if not, who will pay for the shortfall?"

Thirdly, in the Docket, there is no inkle as to what is yet to be resolved during the next two years. For example, is it that we do not have an appropriate "vital" end of train technique? Or is it at this point still unknowns, with the anticipation that there will be new surprises, to be handled by additional "fixes" and "patches"??

Two issues need to be recognized in the supporting "packet" to this Docket Response. . a) Originally this writer believed the NAJPTCP effort had requested an extension of six months, not as now in print, two years extension by the FRADocket. b) In the supporting "package" threaded all the way through the material; as a professional opinion of the material, and a term of "contempt", the term "patch" was employed. It is with some satisfaction to find that Alan Polivka himself utilizes the same term; however this just adds to the complexity of the project, and highlights lack of ones original qualification and understanding of that which one is attempting to emulate.

### **Position of Others**

The traveling public be dammed -- rather than taking steps to utilize existing "off the shelf" technology years ago previously provide reasonable travel time in the St Louis - Chicago passenger train corridor; now we add another two years to the interval where we provide the traveler the option of rail vs highway Interstates I-55 and I-57..

As Amtrak's locomotive fleet is almost in its entirety arranged for multi- aspect continuous cab signal arranged for high level, 100 hertz, with speed control, it could have been a good investment to have participated with the Union Pacific to have equipped the wayside territory and a few of their locomotives to acquaint their operations with the advantages to be obtained in a demonstration mode; for even though the UP have lived with an Albertross around their neck with their two aspect, low level, 60 hertz scheme of cab signals,, even though the are migrating to four aspect concepts, it is believed it is still being accomplished with 60 hertz and no provision for operation through turnoutys and crossovers.

## Discussion:

### Fraud:

In this Docket, The Federal Railroad Administration (FRA) have actually created an **"Act of Fraud"** against the Congress, the Public, and Industry. As the issue is one of the significant flaws with in the scheme of things involving the NAJPTCP, the omission of the issue can not be an accident, oversight, or sheer ignorance; but rather a deliberate act.

When the FRA, in their tabulation of various rules for which Waivers and/or Relief was desired, **paraphrased** the text of many rules when writing the docket material. In regard to Section 236.511, the **operatable words** were **"continuously controlled"**, which obviously were omitted. Now in the "justification" in the corresponding basis for request for relief of the rule; the original omitted **"continuously controlled" is not responded to.**

It is this writer's opinion, that this omission in paraphrasing the original rule in the Docket text, and the removing of the operative words, which define one of the **serious shortcomings** of the NAJPTCP effort, was **intentional**. The FRA can not blame the omission on others, for they, the FRA added the "boiler plate" sections, and arranged the format of text for publication, **and signed off on the docket's** six pages, and having it published in the Federal Register.

### Catastrophic:

It is noted that the Docket does not request relief from Section 236.205 "Signal Control Requirements"; which essentially require use of "track circuits"(and what they will perform); therefore the project has committed itself to use of conventional signal track circuits. This impacts the project such as to drive its costs to excessive heights, particularly as they now will exceed the cost if they had elected to employ just modern day off the shelf technology (in the first place years ago) The present situation is that the "track circuits" and their costs, will not be utilized to the full extent of their capabilities. (All this is contrary to the pronouncements of earlier cheer leaders; to include Alan Polivka's recent tout : "... lower life cycle costs..)

All this flies in the face of the ~~FRA's~~ prior comments relative to a 25 year life cycle for processor based equipment ( 50 year for conventional signal equipment) and: "... that the original designers of products....could likely be unavailable after several years of operation of the product...." (66FR42376).

What is bothersome to this writer, that with the concepts of the NAJPTCP effort, what use is made of track circuits is squandered as contrasted with their capabilities and functions in a more dense railroad operating environment.

As a second catastrophe, at some point, it will be realized the NAJPTCP is an **"All or Nothing"** expensive concept, not adopted to incremental growth and expansion, particularly as it seems restricted to low density rail traffic in sparse territories and hardly able to handle hundreds of trains an hour, with mixtures of train classification; already in existence in urban environments. (And ;providing, in fact those features, which the NAJPTCP tout as their own and their insinuation that such capabilities do not exist).

### **Omissions:**

There are some minor as well as serious issues the NAJPTCP are faced with in the Docket that have been omitted. For example, Section 236.3 "Locking of Signal Apparatus Housings" (Which apply to the cab signal housing on the locomotive).

A serious omission is Section 236.563 "Delay Time", which in turn relates to Section 236.24. To implement its intent, and to which conventional modern "off the shelf techniques" adhere to (And aggressive intelligent railroad properties provide for, depend upon such capability, with "Interlocking over run protection, et all), its intent is to cause an **immediate** change to a locomotive awareness of any hazard or change of authority, even immediately in front of the approaching engine. (This is a major shortcoming in the Chicago-Detroit Corridor, which the FRA representatives on the ground walked right by - it being possible to take as much or more than 20 seconds, to alert a train when a signal ahead drops in his face).. This is a significant issue with the mentality of operating one train at a time in the NAJPTCP; for with several trains in the area one would start to face "congestion" issues, and with the characteristic serial processor operation of information (both in the processor, and delivery of intelligence back and forth -say from the field, central control then back to the vehicle), having an impact on the "response time" of an incident and its correlation with a specific train. The glib response would be to increase the data rate, add more buffers, and improve the thruput of one's "server"; but for all increases, one adds the exposure to errors and vulnerability to extraneous interference.

An omission which **could migrate** with unexpected consequences, could be found in Section 228.5(c)(3) relative to employee engaged in installing, repairing and/or maintaining signal systems.



### **Illogical:**

In response to Section 236.501, the Docket Justification states in part: "... and will not enforce speed restrictions indicated by signal aspects...(67FR49384)

In the text, the statement is made , in part: "...The current operation will remain in effect whether PTC is operational, fails, or is cut out...(67FR49363).

To make it more **interesting, and adding to the confusion** is that Section 236.501 is **repeated** in another section of the Docket, **with yet another justification** (67FR49385).

This is just one more example of the question: Has the FRA lost its way? Or is it a case of lack of understanding, with those signing off on such a document, having no idea of the issues???

### **Errors:**

The most serious error in the Docket was , as previously discussed , under the topic "Fraud", was subtle or intentional removal of the operative words of the rule Section 236.511; and thus not responding to the issue (one of the flaws in the NAJPTCP design).

What is unusual is that the layout of the Docket has rules in numerical order or sequence, until the end, where a second sequence of cab signal rules are injected and Section 236.501 is repeated **with a different text.**

### **Test Programs:**

In the justifications for waivers from certain Rules, reference is made to the effect that test programs are not yet developed and will be available at a later date. This is **not a confidence factor** as it cries out that we do not know what we have yet.

### **Support Information:**

#### **Attachments:**

Attached to this Docket response is a "packet" (Of concern to the FRA, as it contains many references to the FRA), consisting of a "transmittal letter" to Alan Polivka to include four attachments; which is intended to be a part of this Docket response and include additional background thoughts, in respect to the FRA's intention to grant various waivers of their rules to implement the NAJPTCP test program in the St. Louis - Chicago Corridor. The attached "package" was originally put together on the basis of earlier correspondence to both David Gunn, Pres, of Amtrak, and Frank

Hertl of Illinois DOT respectively, objecting to their continued support of what appears to be unfolding as an elaborate expensive endeavor, suitable only for light sparse rail facilities on an "All or Nothing" basis.

In each case it was suggested that I convey my concerns directly to Alan Polivka.

it will be of interest to see if Polivka responds in a responsible manner, or even understands in depth "what is out there" such as to equate the state of the art technology presently in service as contrasted with the "anticipated attributes" of the NAJPTCP.

### **FRA Parallel Programs:**

The FRA are in a bind, in that as they have now declared that any application for a "PTC" project must include means to provide for "broken rail protection". Now there is a "vision" that a less expensive, more effective means can be found in lieu of conventional track circuits.

Now the FRA have contributed funding to the Transportation Technology Center, Inc (TTCI), in support of a "Demonstration of an Acoustic Rail Break Detection System" (Report RS-02-004, May 2002)

In its "Executive Summary", the TTCI Report stated "Information **provided by the vendor** suggests initial costs for the acoustic detection system are approximately 2/3 those of typical track circuits; however TTCI report that they as yet have not made study of such cost considerations. (It is hoped the authors recognize, as a practical matter, track circuits furnish other functions than just broken rail protection and train presence detection)

In the Executive Summary, comments are made as to certain types of rail failures that a track circuit might not detect; however, if one reads on through the details of the report, one will find there are many different types of rail failure which the acoustic scheme is not able to detect.. The response time of the system makes a mockery of the closed circuit continuous nature of the conventional track circuit??The authors got mixed up on their understanding of relative characteristics of rail shunting sensitivity and broken rail protection; failing to understand the variations among various properties as to the track circuit length, energy level employed and nature of track circuit -- e.g. 100 Hertz, 60 hertz, Direct Current, audio frequency over lay,, coded, reverse code, steady energy,, end fed, center fed, single rail, two rail, light energy, high level energy, and any combination there of. Then there are the more exotic "Rail Highway Crossing Predictors and proximity type schemes to add to the mix.

There are holes in the presentation; for example, they address the issue of attempting to get through a "track circuits" which may be applied for rail highway crossing protection devices; yet they over look what could be a serious damping effect of an actual crossing, per se, where the rubber type blocks of a modern roadway crossing surface design are closely pressed against the outside surface of the rails.

Obviously, the tests did not envision what happens in a winter environment -- e.g. Sleet and snow covering the solar panels, and snow **tightly packed** through the entire track structure and **above** almost for the entire winter season; Section 229.71 of Part 229, Title 49 CFR; for locomotives, not less than 2½ inches above the top of rail(acts to pack and shear the snow-- ever see a snow plow on the front of the locomotive rather than a "cow catcher"?)-- Over all, requiring both pick and shovel to even find the track structure below.

The authors speak for a "gain adjustment" on the "transmitter unit"; in addition to the existing "gain setting" on the "receiver unit"; which **masks** what could be a major maintenance cost; especially, as one rail repair in the field, as demonstrated, could introduce such a change as to put the system "out of service".

These are brief comments, not intended to be all inclusive. Just ~~think~~ now we have a "patch" of dubious value; which in its self, provides no other function.

#### **FRA Forces:**

Is it possible that the FRA continues to embrace the NAJPTCP effort, in spite of its obvious flaws, expense, limited capabilities, et all, as a matter of a project for internal security and affluence??? Having been **within** several Federal Organizations over the years; is it possible that the FRA have been infected with a "Civil Service Disease" which causes one to gain more projects, increasing burden requiring more people, then find more money to manage and spend, all amounting to an expanded "job description", then to file for an increase in ones "GS" rank, or at least "job security"? Thus the FRA could be reluctant to let go of the NAJPTC effort, even though , at this point in time, the hand writing is on the wall, and enough is now known such that it is time to close down the effort.

This reminds this writer of a parallel situation, back in the sixties, when within the now defunct Ground Electronics Engineering Installation Agency (GEEIA), in following a similar project, **over run in time and budget**,, in asking a civil service project engineer as to "what gives"--- the response "Colonel, we started to build a "Dachshund" and ended up with a "Giraffe"; but no one knows **who stretched the neck and legs**".

## Conclusion:

### All or Nothing:

The NAJPTCP effort has demonstrated, with its past five years of effort, and an anticipated need for two more years (If at all then), only to display its value with a "single demonstration train"; that it is becoming a frightfully expensive and complex "scheme"; which violates all basic concepts of the "Kiss Principle" (So necessary for a far flung railroad's operation and maintenance).

As the "scheme" continues to unfold, with all its fixes and patches; it seems apparent that its configuration, out of necessity, crates a situation where it is "All or Nothing"; and even then, obviously capable of only handling a minimum level of railroad traffic in an environment of not much more than a single track configuration.

Has any one recognized the severe maintenance and operating burden the NAJPTC would impose on a railroad? If we were five years, and another two years to "figure it out", what is it going to take in manpower and dollars to attempt to keep such a scheme in operation??

### Nothing:

As the NAJPTCP effort major funding source has been the Federal Railroad Administration, and as an anticipated further funding source undoubtedly will be required, to support the declared extension of time; as an unexpected consequence; has anyone with the **necessary technical and hands on railroad operation background**, sat down and evaluated where the NAJPTCP is headed **as contrasted** with existing modern "off the shelf technology"; for there is a potential **Public Relations Disaster** unfolding, if the traveling public in the St. Louis-Chicago Corridor were made aware of their opportunity to have had **improved transportation** years ago, if it had not been a bureaucratic inspired effort, and expenditure of redistributed tax dollars, to attempt, and now continue to do so, to "re-invent the wheel"; which, **in effect, blocked any possible prudent** transition and/or migration to a more sensible proven "off the shelf" solution.

Any evaluation, by a **qualified individual**, would have **no difficulty** in identification of those issues so blithely touted by the advocates of the NAJPTCP (and which they claim as their very own, and not otherwise possible any other way), **can not stand up against** those simple proven techniques which **currently exist**, no matter if it were "safety", "cost", "Operating advantages", "reliability", "maintenance overhead", "interoperability", "Track Maintenance Force Safety", et al.

For this writer, a serious problem is the realization apparently, that the majority of cheer leaders, brochure writers, and supporters of the NAJPTCP appear to lack any depth of background in either years of responsible experience and/or broad technical background in the field, as to have any idea in depth, as what is out there, how it functions, maintenance issues, and of most importance, the ability of present off the shelf techniques and ability to be installed on an **incremental basis (Both in the sense of level of features, as well as to the extent of territory to be covered)**

#### **Phase Down:**

It is important to recognize, there are portions of the NAJPTCP that could be salvaged; for example, as a means for say locomotive "health" communications, where safety is not an issue, nor is the coverage requirements so severe; however, to replace the existing simple, proven train control function is another matter.

The Docket FRA 2002-12113 should be recognized for what it is **"A Big Red Warning Flag"**; for in the mind of some, it is but an "Administrative Tool" to allow the NAJPTCP effort to proceed with "live tests" on an existing railroad right of way. Anyone with a combination of experience and qualifications can see beyond that simplistic objective, and realize that actually implement such a project **would still require** a major portion of the some fifty plus waivers requested for the testing phase (If not more so, and an added burden besides, as exemplified in the FRA's Docket FRA 2001-10160 "Standards For Development and use of Processor Based Signal and Train Control Devices").

Today, no one has demonstrated, if it were possible, precisely how "waivers" required to implement a NAJPTCP project would benefit or be superior, for the benefit of railroad, the public, stockholders, tax payers, employees, et al.

As it appears the FRA have found it possible, with required equipment, staff support, etc., to provide a Public Relations Internet endeavor; why not phase down the NAJPTC, save what one can, then turn it into an advantage, on the basis it was a good try with lofty expectations; but with passage of time, the previous anticipated advantages have evaporated; therefore we have recognized the issues and intend to re focus our efforts on enhancing the St. Louis-Chicago Corridor for the benefit of the public, with proven technology for the operation of trains; rather than still block progress another two years, plus, in respect to travel schedule reduction in "running time"

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21 August 2002

*Part of*  
**Docket FRA 2002-12113**  
**The Simple Issue of Liability**

If Amtrak and/or Union Pacific were to attempt to impose the technology, as presently proposed by the NAJPTCP effort, for any injury involving an employee and/or member of the public (or property damage) the railroads would be exposed to severe liability, as well as punitive damages.

For a "Plaintiff's Attorney" such a situation would be a **gift**, as the issues are clearcut. As Amtrak, by its own efforts, has currently and previously achieved installations that are reliable and safe -- to embark on a venture that attempts to implement a "vision" only serves to reinforce the lack "of prudent judgement" in any choice to attempt to implement the concepts as espoused by the NAJPTCP efforts!?

A railroad property has many issues to contend with if it were to attempt to defend itself in a court of law against any incident that might arise out of any attempt to implement the concepts of the NAJPTCP effort, to include but a few issues:

- a) The Federal Rules and Regulations
- b) Simplicity vs Complexity
- c) Expanded need for "Vital" circuits and redundancy
- d) Dependence upon facilities not under one's direct control
- e) What does the employee need in both training and equipment
- f) Costs and Obsolescence
- g) A Case History
- h) Conclusion

And beyond the realm of injury and liability, the NAJPTCP effort also, for a independent railroad, has exposure to stockholder's lawsuits on basis of squandering corporation resources; in the face of earlier like projects; that too, also after expenditures of millions of dollars of corporate assets, with no identified results and/or demonstration of any economic break through.

**a) The Federal Rules and Regulations:**

For starters and/or an "opening, a well qualified (or coached) plaintiff's attorney, in making a presentation to a jury, has four quick thoughts which would be easy to put across:

1) The FRA enjoy the cloak of "Federal Supremacy"; therefore they are blameless, in no way accountable for the direct and/or unexpected consequences of their actions or touted objectives.

2) The FRA in their Rule making relative to "Processor Based Signal and Train Control Systems", in reaching into the future have defined and stated, for facilities and

systems that are not yet in existence, have gone so far as to state in their discussion: "...In essence, the proposed requirement would impose a strict liability standard on the railroads regardless of culpability...." ( 10 Aug 2001, 66FR42363 ).

. The FRA being aware of the very nature of the NAJPTCP effort being unable to exist without numerous waivers from the earlier principles and methods adopted by the railroad industry, years prior to the very existence of the FRA; have abandoned the railroad industry in respect to signaling technology, the very basic premise : "Zero Tolerance of Failures"; as they reach out and obtain solace ( CYA - Cover Your Ass) and embrace the concept of "statistical analysis of Risk Assessment". As a typical FRA statement to illustrate their "fuzzy thinking", they state in part: "...This proposal would require demonstration with a minimum **ninety-five percent** confidence level that the likelihood that the distribution of risk for the proposed system is not less than the simple mean for the current system..." ( 10 August 2001, 66FR42356). Two glaring issues that a jury could understand, in the FRA's own words, are the mental comparison of 95% with "zero tolerance. Also, a basic flaw which permeates the FRA's thinking is reference to "the current ~~system~~" rather than correlation with other options available in "off the shelf technology". As the FRA consistently employ the term "the current system", we could be proposing to replace a system of "Indian Tepees" on combination with use of "smoke signals".

It can be shown to a jury that the FRA themselves are not comfortable with their own new found criteria, when they state in part: "...If the public is to be served, FRA should not be shackled by its own performance criteria, and pro forma compliance with risk assessment should not bar inquiry into whatever, as a ;practical matter, systems, "may be operated safely without unnecessary risk of personal injury". No amount of research is likely to make risk assessment a pure science and no amount of litigation over it will protect employees and the public from patent hazards identified after the fact..." (10 August 2001, 66FR42359 ).

4. A major flaw, in the litany of the FRA, can be found as the very caption of their rule "Applicability, **minimum requirements** and civil penalties " ( Section 236.0, Part 26, Title 49 CFR) (Bold type added). There is so very much not covered; yet included within the practices of many responsible railroad properties.

In the interest of safety and prudent judgement, the realm of issues not included in FRA rules and regulations, involve signal circuit design as well as various mechanical details. ( e.g. The FRA rules do not touch on use of code

change points, over run protection for both wayside and cab signal at an interlocking. As a mechanical detail, the option and prudent side of switch layout where one would place a switch machine. (Even the National Transportation Safety Board (NTSB) with their self esteem, missed this one after investigation of a multiple fatality, in stating there was nothing wrong with a track switch layout that derailed a car of the train, throwing it into a braced column, resulting in deaths as the car was sliced by the flanges of a 12" x 12" I Beam. This involved a dragging traction motor that struck and bent the switch machine operating rods--Now with switch machine on the wrong side, with the route "normal" (the higher speed route), the rods were in compression -- thus when struck and bent, resulted in normal switch point to be pulled open-- thus tossing the next set of car "trucks" to be pulled out of line and tossing car into subway roof support beams. Now if the switch machine were to have been on the side of the "normally closed switch point", the rods would have been under tension when the switch layout was in the normal position; thus when struck, would have made the normal switch point even tighter against its stock rail, thus no derailment and no deaths. --We have not touched on the issue of the optimum position for a point detector rod, which also involves the placement of the switch machine on the track layout. This incident relates to a derailment of a Philadelphia SEPTA subway train, on the Market Street Line, just east of the 30th Street Station).

With all this, one need only point out to a jury that even with an agreement by the FRA of a NAJPTCP effort; where is the protection and identification that includes the myriad of safety considerations not included in FRA's questionable absence in their rules, of a normal railroads individual standard practice??

#### **b) Simplicity vs Complexity:**

For a jury, a Plaintiff's Attorney with but two simple contrasting charts, can demonstrate to those with little or no technical understanding, the major differences between "off the shelf" choice vs that expounded by the NAJPTCP effort.

It would be appropriate to initially start with two basic FRA rules; which are a foundation of FRA's ordained concern for "safety", and recognize that the NAJPTCP effort would require relief from compliance, with waivers.

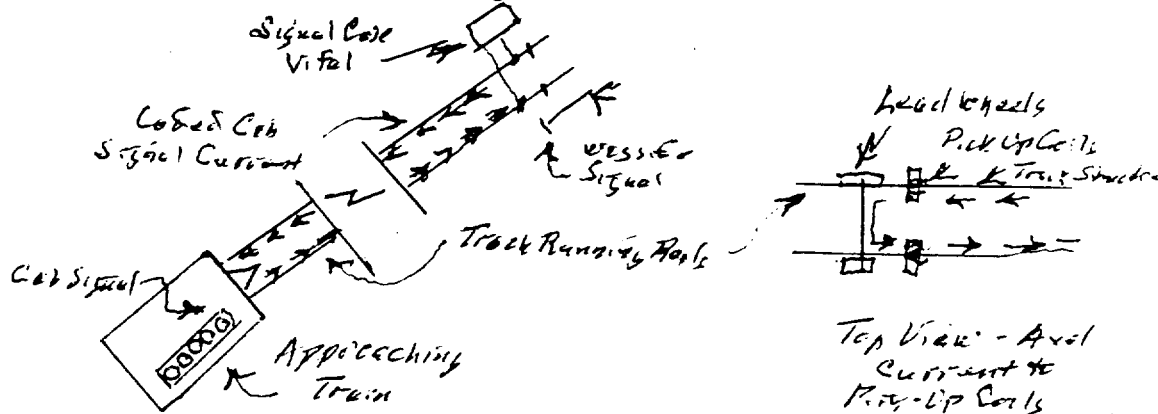
"236.5 All control circuits the functions of which affect safety of the operation shall be designed on the closed circuit principle ..."

"236.511 The automatic cab signal system shall be arranged so that cab signals will be continuously controlled



in accordance with conditions described in 236.295 that obtain at least stopping distance in advance",

### Basic Elements of A Conventional Continuous Multiaspect Cab Signal Installation



1) The code keeping the appropriate aspect in the intended locomotive cab is **continuous** -- loss of code, or steady energy causes engineman's display to go to "Restricting".

2) Both the wayside signal aspect and "code rate selection" for the locomotive's cab signal are **controlled by the same instrument**; therefore guarantee of agreement (e.g. Section 236.514)

3) All local circuits and facilities in the field are "vital"

4) The code in the track rails, with out a train in the block, can serve on a vital manner to convey the intelligence from one signal block to the next signal block (to include passing through any intermediate wayside "cut section").

5) Any required connection from the wayside site to a central dispatch point need be only "non vital".

6) Wayside has the capability of operating independently and safely, even without any connection from central dispatcher's office.

7) One is transmitting a code related to a specific aspect called for, directed, and only to, the specific vehicle who needs the intelligence, without the need for any "address" or need to know whom the wayside is talking to.

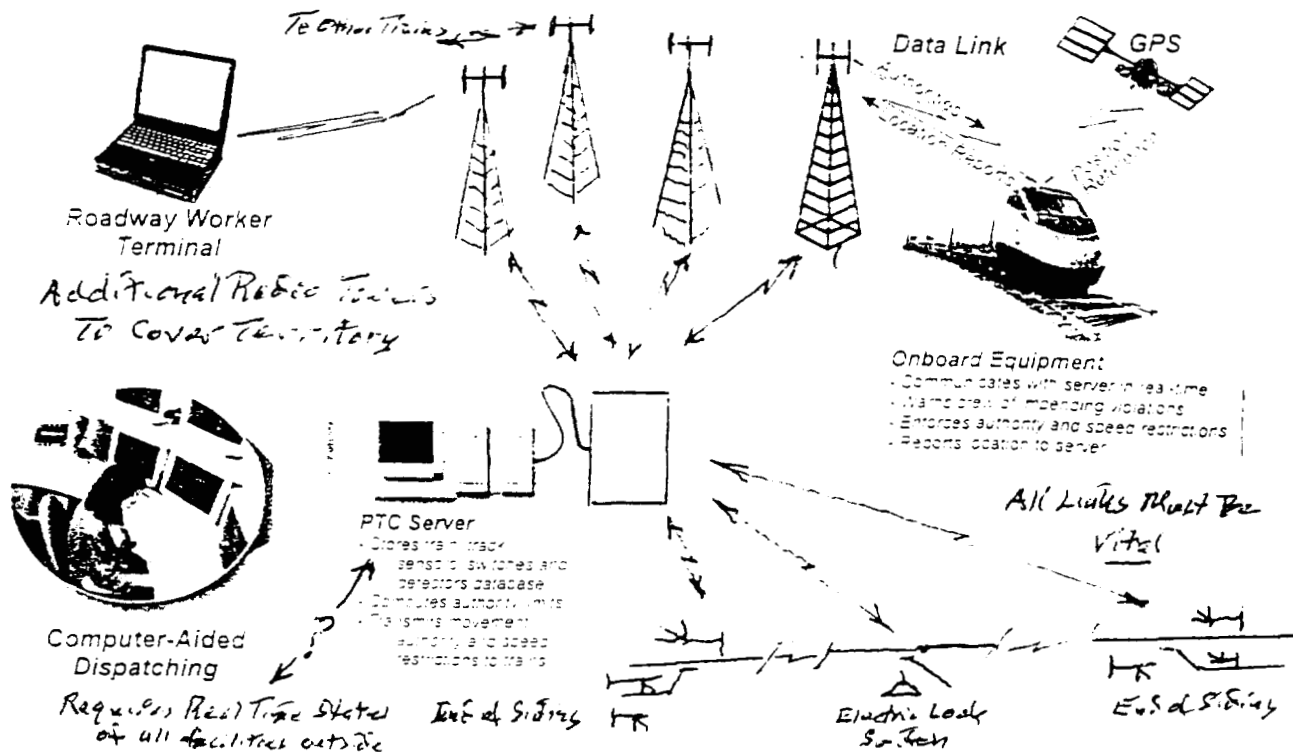
8) With loss of wayside or locomotive facilities, the concept allows a reduced speed limit; but still maintains the capability, to "continue on to ones destination" (Or recover if appropriate.).

9) The system allows means to "cut out" its system, when operating in dark territory; but forces an engineman to "cut in" as soon as he enters equipped territory (236.534)

10) The connection from the field to the dispatcher, as previously mentioned, may be "non-vital" and yet inform with a considerable added dispatcher's detail to insure his ability to perform his task.

11) The simplicity of the rails as a transmission path for code allow of design of "code change points" (To operate consistently at precise location desired); and at interlockings, to be able to hold off code over various routes other than those specific movements as intended; as well as to immediately remove code to a vehicle when his route is over-run by another train, or obstructing hazard, et all.

Now in sharp contrast, we have an outline of the NAJPTCP effort; as extracted from a figure presented in a recent "puff" article recently published; modified to include multiple base stations, rather than only one as originally presented-- when originally titled "Operations Concept for NAJPTCP"



The NAJPTCP as being attempted to be implemented in Illinois is identified as the "Illinois Department of Transportation Positive Train (I DOT PTC). The NAJPTCP is to establish "workable standards"; while I DOT PTC is the implementation of those standards on a specific installation of those standards as a demonstration project. (From now on, the terms will be interchangeable)

The I DOT PTC scheme , for starters, can only exist with waivers or relief from many FRA basic concepts proven and having existed years prior to the FRA's very existence. The first two rules 236.5 and 236.511 previously outlined, both of which make major contributions to a "fail safe" culture are flaunted and ignored. The original I DOT PTC scheme of operation as published, is vastly brief omitting many factors, that are required to make "patches " to their concepts (Is it not a coincidence, that the project has asked for a six months extension for the project, "to work out some of the now recognized "fixes and patches"?).

1) The entire concept of I DOT PTC is dependent upon n explosive expansion of steps and systems, all of which function on basis of "contention" (Issues are idle and perform no function until called upon, and even then, as the myriad of extra steps are asked to function in a serial manner, the failure of any of the serial sequences of steps risking a hazardous situation or impede the function of **moving trains** with dispatch and safety from "A" to "B".

2) The very concept forces the need to originate and control specific series of address identification for each locomotive; both in making its announcements of its location, as well as attempting to reach a specific locomotive.

3) For all radio links , both in transmission and in receipt of message, the intelligence involved must have the added process of placing the information in a digital format, and upon receipt, to convert the digital format back to the original sense.

4) The original I DOT PTC simplified "Operational Concepts" states for the PTC Server: "Stores train track sensors, switches and detectors database"; however it conveniently omitted the reality that the outside world is in a state of continuous flux and it is necessary therefore that more than store any such data base is dynamic and must be immediately active, as outside wayside changes can have a major impact on a train's "authority".

5) The simplicity of having both a wayside signal aspect and a cab signal indication both immediately subject of change together; but also in agreement by the standard practice of having them selected and/or their control of both in the same instruments. (Section 236.514 Part 236, Title 49 CFR). For a qualified or well coached plaintiffs attorney, it would be an impressive and "fun job" to lead a jury through the trail **for existing technology**, to indicate both wayside and cab signal selection originating in common instruments to insure agreement; then applied to the very track rails the train concerned is operating on, to convey the intelligence to the locomotive, all in a "vital" manner, no address required and regardless of the on coming trains

location, all elements of which are under the railroad's direct control. **In sharp contrast**, for the I DOT scheme, any change in the wayside, say a signal aspect, must find its way to a central computer (server) after appropriate identification and status, then for the computer to determine, in a serial manner, where all trains are that might be impacted by the change (or impacted in the future by the change). With the new process of identification, to know where train is located, what radio station is available to call the locomotive with appropriate conversion of intelligence to digital format, then for the locomotive to recognize the digital information is for him, and decipher the digital format back to what action is required on his part. What is a new severe demand is that all these links must be "vital" communication links, and as they operate on basis of **contention**, the question arises as to provision for redundancy for every added step and process along the way. It might be noted much of the added process and links are not under the railroad's direct control, and going so far, that the choice of some of the radio frequencies carry a FCC footnote to effect that no assurance exists that one might not encounter interference, and if so "you are on your own".

The Plaintiff's Attorney could have fun in a summary --- you have and need the track rails to operate trains on ----- why not employ them to notify a train of the appropriate continuous cab signal display, rather than to roam around the country side via the added use of radio and the added links to a central processor only to have to find and get back to the train involved via the serial functioning of a central computer?? The attorney could inquire as to the issue of **priority** traffic and contention; non-existent in conventional technology; but an added problem to be contended with the NAJPTCP schemes ((Particularly as we tout **interoperability**, there is more than one device and/or train involved in a realistic operation as contrasted with the stringing one train at a time through a lightly traversed route as exemplified by the I DOT PTC project).

6) The Plaintiff's Attorney can point out, that as one employs the track rails to operate trains on, and as, in conventional modern cab signal and speed control territory, as train detection is established, which provides the protection for all other trains involved. is it not a simple question; **why not utilize the track rails you already must have, for the additional benefits they can and do provide??**

**c) Expanded need for vital circuits and questions of redundancy:**

The existing modern technology well built, easy to identify and maintain with test activities involving a minimum of expertise and readily available as also employed on other facets of signal work..If something happens to the

track rails structure, ones transmission medium, who cares? - for under such circumstances, you are not going to run trains anyway. As the local site is protected by storage battery standby, in combination with local individual inverter packages, driven by the battery bus, to provide 100 hertz energy, the individual site is completely self contained. (This to counter the mental image of many that an individual 100 hertz transmission line would be required).

Now our Plaintiff's Attorney could take the railroad expert through each step in the I DOT PTC concept and inquire what redundancy or "back up" exists for each item in the system, such as radio base stations, main server, intelligence means from the field devices, end of train devices, transmission links, et al. Also, questions might be asked as to types of back up systems employed - alternate power supplies and other facilities, and what of environmental control needed (heating, air conditioning, etc)., to say nothing of "back up" and facilities required for any form of "disaster recovery"

The plaintiffs Attorney could also follow the gist of questions related to maintenance both in depth and skill of personnel required as well as level of sophistication of test equipment required. (Added needs for FCC radio maintenance license requirements?).

On the issue of redundancy and back ups, the door to open, for a path of interrogation that a jury could quickly grasp, are the two questions -- How quickly and the ease of identification of an individual site or locomotive that has a problem, and just what transpires in each situation to get the train safely across the route, with minimum impact on other trains -- both for the conventional modern conventional multi-aspect cab signal facility as contrasted with the I DOT PTC scheme??

As a low blow, the Plaintiff's Attorney, in each situation, can ask as to what the railroad might expect from the investigation of the FRA's swarm of "high school level" field forces at the time of an incident and with their lack of understanding and qualification, to cover themselves would be prone to close down the railroads operation until someone sorted it out and insured the FRA (and NTSB) that there can be a continued safe operation. In today's situation the Plaintiffs Attorney could reach to the very top of the FRA's Bureau of Safety and inquire railroads expert, if it was possible to outline the depth of the person at the top as to education, technical qualification, and level of responsible hands on experience when employed on where he worked as a signalmans helper.

**d) Dependence upon facilities not under direct control of the railroad:**

For a very quick visit, to establish an important

"check point" in a summary to a jury; it would be easy to define all links in the I DOT PTC chain of intelligence being subject to outside influences; such as unintentional or intended disturbance to a radio channel for example : In this day and age, particularly in urban areas, the NIMBY problem (Not in my back yard) for such installations such as radio towers. Then there is the need for and reliability of the environmental control and its back up. What of added problems of storm and lightning exposure (Ask CSX how one strike of lightning shut down their central control center at Jacksonville, Fla.).

The Plaintiff's Attorney could play a few choice samples of the Coast Guard's announcements of Global Positioning Satellites (GPS) that are out of service for days at a time ( 1-703-313-5907 ) then ask, as the locomotive is to employ the GPS concepts to determine where it is at, in order to report back to the central computer where it is at (and hopefully such a scheme as to have the rear "end of train device" indicate where the end of the train is, again to report to the central computer. Then the Attorney may ask, just what (on a moving basis) just which of the twenty four satellites he is expecting to employ at any point in time, as contrasted with the status of specific satellites out of service.

**e) What does the employee need in both training and equipment to be able to do his job**

Another area a Plaintiffs Attorney with proper background or coaching, could get before a jury; particularly when it involves more than one craft, who now can become involved in the hours of service law ( Section 228.5(c), Part 228, Title 49 CFR). What type employees and quantities and where needed to be available, for all facets and levels of added technology and facilities added by the I DOT PTC ~~scheme~~ and/or the NATPTCP effort?

With an unintended incident can management depend upon having a sufficient number of well qualified employees with adequate over all understanding of all facets of the installation and the interplay of all its components, to immediately identify and arrange a "fix"; or will the system have to allocate the time and effort to assemble a committee in order to determine the details of the situation??

The experience of "holding" more highly trained employees in the competitive market place for highly qualified individuals??? (Case history of Metro-North at their Grand Central Terminal in New York - they went to processor based interlockings in the terminal; were forced to acquire and train additional employees for software, etc. To day none of the original individuals are still there, having gone to jobs elsewhere; thus need to acquire and train new employees).

Is the simple rugged volt-amp-ohm meter still the only mechanic's practical electrical measuring tool to allow one to do his job??

**f) Costs and Obsolescence:**

For documentary, one only need to examine the FRA's docket FRA 2001-10160 relative to "Processor Based Train Control" to find standard signal hardware in use in signaling has a fifty year service life, while "processor based" facilities can be expected to have only a **twenty five** year service life.

The railroad's expert can be questioned if he ever handled a processor base device where the supplier guaranteed to support the facility for more than eight to ten years (and if the expert did not know, he would be ripe to have his credentials challenged). To day we have the new issue, a software issue, etc., can be at risk in spite of a contract, where the original company or source has gone out of business and/or source is from a foreign land where one has no leverage to force an issue.

Now if obsolescence forced replacement of a unit and/or facility, how will it fit into the balance of the existing complex, particularly as "software" might be involved'??

As mentioned previously, the public announcement by the FRA, to effect that they will not approve any project involving "Positive Train Control" (PTC) without there being provision for "broken rail protection". The funds the FRA are supporting at TTCI, in the quest to find a method (other than conventional track circuits) that is less expensive both in regard to installation and maintenance ; which have developed to be only humorous expenditures of money. The very expression that an underlying scheme of track circuits, when added to the maze of additional systems and facilities involved with the I DOT PTC both installation and maintenance, are climbing so high that in combination, **there is no further reason to even consider the NAJPTC efforts.**

Attempts to estimate costs of track circuits, to date, have evidently accomplished by those who have no notion or experience with the features that conventional track circuits provide; not only cab signal code, but also "vital" transmission of intelligence from one signal site to another, and incidently contribute at such facilities as rail highway crossing configurations.

It would be interesting to see how the NAJPTCP scheme provides for example, on a "vital basis" approach locking for an interlocking, accomplished today with the simple track circuit.( Section 236.305, Part 236 Title 49 CFR).

In the realm of track circuits, features in common use, extend beyond the scope of the FRA rules -- For example, one can provide, say a code change point (to reduce, say an "Approach" aspect in the locomotive cab to "Restricting", say in the situation where the home signal ahead is less favorable than "Slow Approach", at a point say **precisely** a 1000 feet in advance of home signal --- particularly useful where vehicle is equipped with "speed control --- This is just one more example, where a property elects to be more stringent than the rules of the FRA, --- For example in respect to sections 236,502 and 236,512, one takes it say 1000 feet in advance of a block that is at a "restrictive" position (This writer has been intimately involved in such installation, with all types of track circuits for years prior to the inception of the FRA -- this is said in respect that it is the feeling and impression that all the cheer leaders and supporters of the NAJPTCP schemes, have no hands on and responsibility for facilities in territory supporting hundreds of trains a day).

#### g) Case History:

A Plaintiff's Attorney has a particularly interesting and **contemporary** case parallel to the issues here -- "Prudent choice of options in making an installation". A "case history" to draw upon; that targets this issue of a possible situation where a railroad might venture to accept and implement the NAJPTCP proposals. The issue, would it have been a prudent decision to accept the responsibility for a "venture" where "proven" existing modern signal technology was already available and in service??

The case in point; Superior Court of New York County. Jack H. Wegman, Jr. vs Port Authority Trans Hudson (PATH), 30 November 1999, relating to an employee, where the jury recognized the issue that "PATH", in having made a signal installation in accord with all rules and regulations "failed to exercise **prudent judgement** in not having selected other alternatives available to them( and which they employed elsewhere; when making their original installation.

There is one point a Plaintiff's Attorney would have to deal with, an issue the FRA either accepted or otherwise ignored (and defended previously), which this writer considers a "fraud" on the FRA's part. In the FRA's discussion and rule making, they use the verbiage: "that a proposed signal system is equal to or better than that which is to be replaced". The FRA, its ordained responsibility for railroad safety would be better served if the stated "that a proposed system is equal to or better than modern signal systems presently available "off the shelf" and proven in actual revenue service".

This issue is significant in several ways in respect to the NAJPTCP effort, in particular, the I DOT PTC project,



in several ways, to include the use of "Route Signaling" aspects in lieu of "speed signaling" operating rules. Secondly, the use of a cab signal package capable of only "stop" and "go" and actuated by low level energy at sixty hertz (As contrasted with high level overage at 100 hertz --- the high level improves signal to noise level, and makes it easier to maintain continuous energy over odd track configurations such as a turnout side of a track crossover -- the use of 100 hertz is to gain immunity from parallel commercial power lines, and with higher frequency, enhance the ability to sort out use of multiple code rates)

As originally laid out in the I DOT PTC territory, signal indications convey the information, when a diverging route is involved (e.g. Into a siding) or one was to go, thus either straight or divert; in which case the engineman, on the basis of employee time table, was expected to know at what speed he could traverse the sapecific turnout or crossover. . Now with the multiple aspect continuous cab signals (and as the locomotive aspect is in terms of "speed" -- by virtue of and enforced by the "speed control function"); therefore the wayside signals must match the cab signal aspects [As is obvious; but within the scope of section 236.514 of Part 236, Title 49 CFR] In the consolidated book of operating rules as previously published, the railroads in the west "duck the issue" by having a foot note to the effect that cab signals are not applicable on track turnouts.

This issue causes one to lose respect for the FRA's extolling "safety", as they deem all vehicles of all agencies when operating in the Northeast Corridor be equipped with multiple aspect continuous cab signals with speed control; yet Amtrak's locomotives operating in the west in what is considered "cab signal territory" must, even though so equipped, must "cut out" or disable the "speed control feature". (The FRA response is their typical dodge "At least the AMtrak locomotive with only a "stop" and "go" indication and no "speed control " are at least as good as other locomotives operating in that territory -- It seems even though the FRA have been around almost so 40 years now - there is no available information to illustrate that the FRA has not made any steps to improve the situation in the west. It would be another "fun situation, before a jury, to suggest that the FRA could just as well invested the 60 million to initiate a program to enhance and up grade the earlier vintage of the Union Pacific's St Louis - Chicago corridor, to a more practical level of technology "off the shelf" and employed in the densest territory on this country; rather that squander ones efforts in attempting to ?reinvent the wheel"; which by the Project Manager's own published words "We are not there yet" --- this after years of effort and currently requesting an extension of time)

(See "Conclusion" re Cab Signal up-grade on R F & P)

These two issues of "route signaling" and a lesser quality cab signal technique common to the St. Louis - Chicago Corridor, are mentioned, such as to protect a Plaintiff's Attorney, such that he be aware of the issues; get them out of the way, as not to become involved in any controversy that would distract from the basic issue ---- "Prudent Judgement" employed in one's choice in the face of alternatives", (This issue is quite a sharp contrast to the operating rules related to the "Consolidated Rule Book of "Operating Rules" as existing in the North East United States, which authorizes a train to **improve** its speed any where in a block, when its cab signal advances to a more favorable aspect, and cab signals governing all the way through an interlocking, and in some instances, provides for elimination of intermediate wayside signals. The rules, relative to "speed signaling" aspects; support appropriate speeds through an interlocking, no matter what the combination of switch layout of speeds might be, as well as conditions beyond the track beyond the interlocking -- with the cab signal eliminating the need for "advance automatic wayside signals").

### Conclusions:

This exhibit has been prepared for the purpose to make a railroad management fully aware of the risk of liability in following the path of the NAJPTCP, is such that one could anticipate even exposure to "punitive damages"; particularly as the FRA and others would, in such a situation, would leave the railroad "high and dry".

In such a lawsuit, a railroad would have a dilemma, in respect to expert witness qualification; for if the individual to defend the railroad position was an expert in respect to the I DOT PTC and/or the overall NAJPTCP effort; he could be torn apart by a Plaintiff's Attorney (who either has knowledge and/or appropriately coached) on basis of failure to correlate with existing modern "off the signal technology. If the witness did know the features of existing technology, he would be "dead meat" if he did know the features of what is out there involving thousands of vehicles; thus he would be hard pressed to elaborate in any way, why the ~~w~~ is better or safer.

NAJPTCP

On the other hand,, if the Plaintiff's Attorney had a well qualified expert in the more modern and more widely employed multi-aspect cab signals with speed control, which have operated faithfully for many years, it would be able to high-light the superior advantages as to "where we are" as contrasted with "where we want to go".

If one really wanted to be "rough", a Plaintiff's Attorney could display a contemporary copious document, a "Report to Congress" titled **"Potential Improvements to the Washington - Richmond Railroad Corridor"**, dated May 1999;

then to tabulate under that theme, improvements made on the R F & P territory to improve their original cab signal territory to make it more compatible with that employed in the rest of the Northeast. This would beg the question; in the I DOT PTC territory, to improve Passenger Train schedules; rather than spend 60 million dollars (and we are not there yet) and now more than five years effort attempting to reinvent the wheel; why not have to elected to follow the intent of the "Report To Congress", which envisioned operation up to 110 miles per hour, with some work already accomplished, to include expansion and up grade of existing R F & P level of cab signals technology (previously of the level of the roads in the west) to those of advances as demonstrated over the years in the northeast??



Belknap Freeman, PE  
Illinois Registration  
062-030946

Part of Docket FRA 2002-  
12113

119 Hickory Lane  
Rosemont, PA 19010  
8 August 2002

Mr Alan Polivka  
General Manager NAJPTCP Project  
Asst. Vice Pres of Communications and  
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Transportation Technology Center, Inc. (TTCI)  
P. O. Box 11130  
55500 DOT Road  
Pueblo, CO 81001-0130

**Re: Integrity, cost and feasibility of NAJPTCP as a system**

**Dear Mr. Polivko:**

Recently, Mr. David Gunn, the newly elected President of Amtrak, in response to a letter expressing my concerns related to Amtrak's involvement with the North American Joint Positive Train Control Program (NAJPTCP) specifically suggested that I contact you for further detail and explanation for the project.

Subsequent to that, I received a note from Mr. Frank Hertl of I DOT PTC, with a copy of your recent article as published in the June 2002 International Railway Journal, suggesting that I take my concerns up directly with you.

Placing these two previously suggested referrals into a single letter with attachments, I seek your response, which I would anticipate passing on to Mr Gunn and Mr Hertl.

It is my objective to be constructive, and recognize that you are in a very awkward situation, for which I offer my sympathy. It appears there could be parts and pieces of your efforts which might be useful for the industry; however with the ever changing situation, I am still concerned as a viable, simple, reliable cost effective safe projected outcome, the NAJPTCP flunks on all counts.

Earlier, I distributed a 17 page critique (dated 27 Dec -01) of the publication "I DOT Project - Concept of Operation, Version 1.4, dated 15 January 2000". At that time, it was my professional judgement that the NAJPTCP effort was totally unacceptable. It would be appreciated if you might furnish a hard copy of the I DOT Concept of Operations if it has been updated; but of utmost importance, your response to each of the allegations and issues I have raised in the four attachments to this, and a part of my letter of request, as suggested by others.

To provide you with background, or partial gist of my concerns, enclosed are four "Attachments", as follows:

Highlights of concerns	Attachment I
A simple issue of liability	Attachment II
Comments to a published article	Attachment III
Where is this coming from?	Attachment IV

To facilitate what could be a useful endeavor, I extend an invitation to your being my guest, and a neutral area, for lunch and/or dinner, at a mutually convenient time, at the Army & Navy Club, on Farregut Square, in Washington, DC; to include access to an appropriate meeting room or the ambiance of the "Casbah" for an extended discussion. This is in recognition, that in your normal course of business, you visit Washington, DC in combination with my being a member of the Army & Navy Club (Colonel, USAF, Retired).

A timely response to the four attachments will be appreciated, as Mr Gunn and Mr Hertl of Illinois DOT have both suggested, as previously mentioned, that I turn to you for response to my concerns

Very truly yours,

*Belknap Freeman*  
Belknap Freeman, PE

cc:  
David Gunn, Amtrak  
Frank Hertl, I DOT

In the period of some five years effort, and now an additional extension of time, **and still not there yet**, it seems obvious that a **prudent** choice of existing proven technology would have already provided the improved service, with operability, reliability, economic, simple, and **safe** results, without new problems of obsolesce, and added highly technical additional employees, and being faced with an "All or Nothing" situation, not adapted to any reasonable traffic densities or uses,

As this package also involves the interests of the Union Pacific, that Mr Polivkes might know what is being said to another party to his endeavor, a copy, as follow up to previous correspondence, Mr Jeff Young is included as part of this issue and concerns..

cc:  
Mr Jeff Young, Union Pacific

In your prior letter responses, you indicated U P's participation in the NAJPTCP effort was essentially a business decision to endeavor to find out and verify if there was any economic, operational, and safety advantages in the outcome of the results of the NAJPTCP.

As this project has exceeded its original calendar in its quest to invent and implement a "vision" and now has requested an extension of time, and written comments to the effect that **they are not there yetb (As they appear to be busy adding "patch" upon "patch")** it is an interesting speculation -- that the project, with an extension, will run out of its original allocation of funding and in additional funding is not forthcoming, the Union Pacific and Amtrak would be left uncompleted and/or the problems recognition of unexpected consequences that require additional "patches" -- so who pays for this??.

It is suggested that in addition to George A. Grvalla's pronouncements (PTC Must have broken rail protection), the cost of any NAJPTCP effort would be prohibitive and make a mockery of earlier pronouncements of the project's "cheer leaders"; that one should now recognize at this time, after the lengthy period of attempted development, that the project is not going anywhere, and therefore it is time to close the books (and selvage what one can from the money already spent).

Unfortunately, both with the squandering of both time and funding, it appears the Union Pacific would have been better served if they had devoted their attention and resources to an **incremental improvement program to upgrade** their cab signal packages and with the added operational advantages, at least come up to the standards already in place else where (the quantities of vehicles so equipped being in the thousands).

For the Union Pacific, early on, the bureaucrats order years ago that lead the railroad into selecting a two aspect cab signal for compliance with the original order, was then and is today, nothing more than an expensive albatross around the railroads neck, offering nothing more than an arrangement to protect against "what if".

During that same original period, certain railroads properties, in having chosen the concept of multi-aspect cab signal packages, realized **the additional advantages to ones operations** were such that the multi aspect cab signal provided, which early on, resulted in "voluntary" installations over major parts of their territory.

As one with more than a casual interest in the welfare of the Union Pacific Corporation; as is obvious throughout this epistle, rather than focus ones attention, as previously mentioned, in seeking a new "vision"; it is strongly suggested that a plan be instituted to establish a program to up grade the nucleus of what is already out there, and convert ones two aspect cab signals scheme to a four aspect cab signal, revert to "speed signal techniques", all of which can be accomplished on an incremental basis, and by doing so, gain a useful operating tool for ones effort, in lieu of carrying around an "albatross".

As to the St. Louis - Chicago corridor, for a realistic benefit to both Amtrak and the Union Pacific, it is suggested a better route would have to had followed the route of the May 1999 "Report to Congress" previously mentioned in Attachment II; which already has accomplished certain enhancements of the cab signal facilities on the R F & P.

*Richard Morgan*

cc: Richard Morgan: If you mix cab signals with a common engine condition processor, after you kill some one, will it be that we had a "glitch"???

*Richard Morgan*

Part of  
FRA Project 2002-12113

Attachment I

## North American Joint Positive Train Control Program-NAJPTCP

### Some Highlights of Comments

- Overview
- Waivers
- Interoperability
- Severe Liability
- Federal Railroad Administration
- Radio Links
- Non-equipped
- Software

#### Overview:

The origin of the NAJPTCP originated with but a "vision" to seek a solution, employing modern technology to replace simple techniques which were regarded as "old hat" and therefore to be replaced with a quest to find concepts which would accomplish the original objectives, possibly even better than that which it might replace) - (It is this writer's opinion that the cheer leaders touting a new vision, were those with no foggy notion of the depth of detail and integrity of that which is out there in service performing both reliable, safe, and economically sound, as well as easy to maintain, and understand by troops in the field with a reasonable level of intelligence, especially with its basic simplicity and ruggedness).

All through the NAJPTCP effort, no comparison and evaluation has been made with **over the counter techniques** and proven installations. In fact many individuals in responsible positions have little contact with the existing magnitude and density of traffic **in other parts of the United States** and thus lack appreciation of the myriad of issues involved. (This was evident in the discussion and critique of the I-DOT Project Concept of Operation).

An important issue of the brochures and cheer leaders was the issue of economics -- the "vision" would be cheaper, and less expensive to install and maintain; but that touted advantage has evaporated as a consequence major issues:

The Federal Railroad Administration (FRA) in a recent rule making has conceded that modern processor based technology has only  $\frac{1}{2}$  the service life of existing technology. The FRA in their public arenas have proclaimed no PTC concept will be approved without means for achieving broken rail protection (This means to maintain conventional track circuits- but this is offensive, as it does not address other features that track circuits can provide). And lastly, the tremendous increase in parts population, added links, and software along with patches and fixes, does not come cheap.

If one stops to think about it, with the very nature of the NAJPTCP effort, with its many steps and increased hardware, along with dubious questions as to how one gets a train over the road in the situation of failures, as well as the risk of total system failure, one might ponder the potential economic loss associated with disruptions of service.

Unfortunately, the NAJPTCP effort having originated as a "vision", allowed its cheer leaders to obtain massive funding to attempt to find and develop the necessary support for hardware, software, and changes in operating procedures. Four years, plus, have elapsed, and now another six month extension, in a continued attempt to find an ultimate solution; which raises a new issue -- will the original funding continue to be ample and available to support the extension of time? Then there is the question, if one is busy at this point with "fixes" and "patches", what happens along the road when those issues not previously recognized, crop up - and who pays for that??

From the Public's standpoint, to date, might be a reduction in the total travel time in the Chicago - St. Louis corridor; but after all this time, one must recognize such an improvement could have been accomplished earlier with off the shelf technology. (As will be mentioned in subsequent attachments with this set of comments - does not this corridor deserve the same treatment such as "The Report to Congress - Potential Improvements to the Washington - Richmond Corridor" (1989)).

As mentioned earlier, many of the "cheer leaders" who tout their "vision" of the advantages of application of modern technology, are oblivious to cost, obsolescence and unexpected consequences; generally having no detailed knowledge or depth of understanding as to what is out there "off the shelf". There is a parallel push for exploring modern technology, and most of such projects are funded comes via the Federal Transit Administration (FTA) [Redistribution of Tax dollars?]. In sharp contrast, the railroad is entirely different situation, as railroads are private, stockholder supported, and their activities must be "cost effective"

What is particularly worrisome, is that the extensive lengthy efforts in the attempt to "reinvent the wheel" makes continuous reference to "interoperability"; yet we infrequently thread single trains through a remote territory, unemcombered from unexpected consequences involving unfriendly environmental and rail traffic congestion. Those seeking a vision have no long time hands on experience with such as four trains of different make ups, operating in parallel in the same direction on a six track railroad configuration, an almost daily occupance; or operation on a regular scheduled basis, as many of 28 trains per hour, travelling at 60 miles per hour in tunnels under



the Hudson River (On of our major revisions of the tunnel layout, in the late seventies having this writer's signature, as final approval-- issue here - this writer has been there -- in those days we fixed responsibility. rather as it seems, we dilute responsibility by doing every thing by "committee".) As it is quite uncertain, just how one could apply the "vision" and implementation of the NAJPTCP to such levels of rail traffic in any resemblance of a reliable safe manner as presently accomplished by standard off the shelf technology; thus "so much for those who tout interoperability"

### Waivers:

Much of that which can be found in the Rules and Regulations of the Federal Railroad Administration (FRA) is just "good sense", with a foundation reaching back many decades prior to the inception of the FRA; however, in spite of the NAJPTCP limiting their attention to the issue of "safety"; they are oblivious to existence of additional practice and standards relating to many railroads and individuals in industry, that are either more stringent and/or just not comprehended by the FRA safety rules.

The NAJPTCP effort sits upon such a classical example in their exposure to the Union Pacific Railroad, in particular, to the Union Pacific typical "cab signal package" A bit of history relates to orders of the then Interstate Commerce Commission for certain stretches of individual railroads to install schemes for "train control". In the early days of the late twenties, the ICC gave authority for certain railroads to employ a concept of "cab signals" in lieu of other types of "Train Control" then in vogue at the time. In effect that which follows is to emphasize, content with the Union Pacific cab signal package is **not** to be considered as "state of the art" off the shelf technology.

As of 1934, the Union Pacific had two stretches of 2 **Indication Cab Signals** between Sidney, NBR to Cheyenne, Wyo (102.0 Route miles, 204 track miles) and North Platt to Sidney, Nbr (125.0 Road miles, 246 Track miles) By January 1934,, equipped with their 2 Indication cab signal package, and even then arranged to function with a low level 60 hertz in the track structure (Thus less immunity from interference from exposure to wayside fixed adjacent commercial power lines and their magnetic fields).

In sharp contrast, even in that period back in 1934, some railroads, including the Pennsylvania Railroad, installed 4 **Aspect continuous cab signal packages** 1970 Road miles or 3105.5 Track miles, on the basis of a combination of both ordered" as well as "voluntary" installations (Having found that the four aspect package, in addition, was a useful operating tool). At that time (1934) the

Pennsylvania alone, had 1856 equipped locomotives and 223 equipped motor cars and 406 foreign motor cars. At that time the Pennsylvania was configured as "high level" (with no need to have a rule stating cab signals were not applicable to turn outs; and higher signal to noise levels) and at 100 hertz (to add to immunity from foreign sources, and improve the design of "flat top" filters, in conjunction with higher code rates). Many other railroads subsequently abandoned their earlier inductive train stop or such schemes as 2 indication cab signals, to convert to and employ use of the 4 aspect continuous cab signal package, which included such properties in part or entirely such as the New York Central, New York ne Haven and Hartford, Long Island Railroad, Richmond Frefrick and Potomac, to name but a few.

In later years, added developments such as "speed control" became into wide use, along with many features from the wayside; such as "code change points", over run protection in interlockings, elimination of intermediate wayside signals in some cases, et all. To day, based upon patent rights of two earlier PRR employees (in the mid sixties, and with managements permission, sold to then the U.S. & S. Co.) we now have in service, nine aspect cab signals, completely compatible with slower moving trains and providing the "clear - clear" concept; where in a conventional slower moving train an moving along with adequate braking distance by existing wayside signals; while on the same layout, the high speed train with speeds up to 150 miles per hour, when in receipt of additional high speed cab signal authorities, say a display of 150 mph,, actually is predicated upon two or more successive wayside signals at "clear", to provide an adequate braking distance for the high speed train, yet not interfere with the optimum "thru put" of the mixture of slow and high speed trains (so much for any thought for any need for moving blocks - we already have the advantages previously touted here in service).

There are several things the Union Pacific can not accomplish; to include allowing a train to increase speed to the authorized level any time of an upgrade display of its cab signal aspect (without need to observe and or reach a wayside signal. It is a fundamental; lost on the UP's concepts, to provide for intermediate speed displays to match the safe speed for a train say crossing over from one track to another over a turnout -- actually, the concept of "speed control" to be effective at various speeds, demands a multi-aspect cab signal capability. (This is a serious shortcoming; that even an "Book of Operating Rules" for western railroads adds a specific footnote that their cab signals are inoperative and to be ignored when operating over a track turnout.

The NAJPTCP can not comply with many of the FRA Rules related to "safety"; therefore to be able to function,

necessitates requiring waivers for many rules of long standing as well as basic tenants such as the "kiss Principle" (Keep it simple, stupid" ) -- a vital consideration in the realistic environment of a far flung property, and as might be required, the assistance of a highly qualified technician, to be immediately available even in sparse territories).

The NAJPTCP effort, besides failure to adhere to such fundamentals as "continuous" and "fail safe" (sections 236.511 and 236.5 of part 236, title 49 CFR) , rather than handle matters directly in a simple manner, attempt to emulate an equivalent substitute by addition of many systems, traveling over several trips great distances to handle matters which otherwise are presently handled on a local simple direct basis. This with all the added issues of having addresses to sort out, "contention" through out, problems of "congestion" and the feat required to convert intelligence back and forth through different formats (e.g. To digital and back several times)

Besides the issues of "waivers" and application of "prudent judgement", as exemplified by the most recent FRA NPRM (Notice of proposed rule making), the FRA have outlined an elaborate addition, in respect to an added burden of reports and safety documents related to application of computer processor type train control components (As presented in the NPRM, this goes so far as to say, if the staff of the FRA do not feel comfortable with that, , they might receive from a railroad; they reserve the right to reach out to independent consultants, with such action being billed to the railroad (Anybody around who wants to provide a blank check to pay for the education of FRA personnel who otherwise are not admittedly qualified to do their job??).

### **Interoperability:**

The NAJPTCP endeavor, with its essentially single track configuration and threading one train at a time through its territory in the St. Louis - Chicago corridor fails to create a realistic picture; not only from the standpoint of number of links and systems involved; but also the complexity and congestion of any attempt to emulate its concepts on a more realistic basis, which in its self just makes no sense. There are those who when asked as to ability to handle the Northeast Corridor, fluff it off , with suggestion one would leave it alone, but never the thought that the NAJPTC effort can not make it; yet ignore the concepts of the Northeast could have been applied to the St. Louis - Chicago corridor years ago, and one would have their improved service in place. . Is it not obvious that if "A" can not do the task of "B"; but that "B" can do the task of "A"; then what is the matter with "A"??

Two things stand out -- -- One , the NAJPTCP effort

envisions the support for providing for higher speeds (better schedules) for Amtrak passenger trains; however if the concept were considered safer, more cost effective, then there would be the basis to, and justification, to extend the NAJPTCP vision wherever Amtrak operates; but now we're faced with the realization that Amtrak operates through out the country, in many cases; but one train a day, thus dragging almost the entire industry into being forced to comply and support such an endeavor.

The second theme, when one is confronted with realistic traffic levels in the realm of say 400 trains per day; such thoughts as vehicle identification and computer schemes to keep every thing sorted out cause delays in such systems (as every thing is handled in a serial sequence); and an exproditional growth in facilities to handle such increased flow of rail traffic; yet the same railroad vehicles and train sets move regularly from the most dense territory on to sparse environments, and if interoperatability were to apply, it would intolerable if a second system (such as off the shelf technology for use in the dense operations in the east and then for the same vehicle a full NAJPTCP scheme for operation elsewhere).

Some systems on paper and extolled in brochures, that claim interoperatability over a wide territory, do not always work; which for this writer, such the automobile "E-Z Pass" system for tolls in use in the north-east on highways and bridges -- particularly when in receipt in the mail delivery a "summons" with claim that one cheated crossing say the Betsey Ross Bridge -- pay up cost of toll and twenty five dollars "fine" or be presented with a summons to appear in court (Such "E-Z Pass scheme in the North-east, appears not to work in say the Chicago area).

### **Severe Liability:**

The railroad, if it elects to choose the NAJPTCP concepts, even if admittedly, only on a demonstrated basis, is faced with the issue of liability, on the basis if prudent judgement had been exercised to choose proven, simple "off the shelf continuous cab signal to meet the original mission rather than the multiplicity of links and patches represented by the NAJPTCP concepts.

The FRA, in their world of Federal Supremacy, have gone on to place the responsibility for all facets of system, on the railroad, even for those concepts that do not yet exist, with such specific statements as: "...In essence, the proposed requirements would impose a strict liability standard on the railroads regardless of culpability..." (66FR42363, 10 Aug '01).

The railroads that may be exposed to possible injuries of persons and loss of property, both involving the public and/or the railroad's own employees, is of such a risk, as

to be outlined **as a separate item of exhibit**, in this review of significant issues. We have with the NAJPTCD no product available complete existing to replace conventional "off the shelf" modern technology, even after four years of effort, expenditure of funds in the range of 60 million and additional extension of time still in search of a solution, concerning which one has but a "vision" of possibilities, and political instincts reach so far as to envision the hope to impose such "flim-flam" on the railroad industry on the pretense of the "buzz word" "Safety".

### **Federal Railroad Administration:**

The quest for a "modern" scheme of "Positive Train Control" was originated by a recommendation of the National Transportation Safety Board (NTSB) after an accident at Kelso in the far North West many years ago. That accident did not involve application of conventional modern continuous cab signals in the territory; in spite of such protection with off the shelf facilities, which if had been previously installed would have averted the collision. The NTSB with their inherent lack of understanding, avoided and brushed off any existing technology as being "old hat", and thus "no good anymore". (Earlier Administrators of the FRA, stood up to the NTSB; stood up to the NTSB when it was recognized the NTSB was out of line in reaching for an unrealistic objective).

The FRA at that time coerced the UP and BN into spending in excess of nine million each, plus FRA grant to Amtrak to attempt to develop a package of modern Positive Train Control. The FRA, at that time granted in excess of twenty waivers of the rules, to allow developments to move forward; however, one waiver limited the extent of "record keeping required"; thus, with only the railroad's comment that the effort proved to be too expensive and not cost effective. It was interesting to note - no further papers of information was made available as to just what transpired.

Concurrently with the UP - BN effort in the Pacific North West, Amtrak, with its own resources and talent developed and placed on revenue service, the concept of nine aspect continuous cab signals (with speed control) in their New England route. A feature of such an installation is that it can be added progressively over pertinent sections of the railroad in small increments as funding becomes available. The significant fact here is that over Jolene Molitoris's signature in the FRA order that approved the installation of the 9 aspect cab signal package, it was reported **that exchange of information with the NTSB confirmed that the NTSB accepted the Amtrak New England nine aspect cab signal concept as satisfying their original recommendation that "modern" package of "Positive Train Control" be developed.**

Now over the years, the FRA's "hands are not clean", in respect to their legislative obligation concerning "safety". The FRA has known that Amtrak diesel locomotives operating

up and down and across the county are equipped with a multi featured aspect cab signal package arranged such as to adapt to whatever arrangement of cab signals are installed on the routes the Amtrak locomotive traverses. The FRA are also aware, over such properties of the Union Pacific, it is necessary to "cut out" or cause the cab signal "Speed Control Feature" on the locomotive, as it can not function against the provisions for cab signals on the wayside ( One gets such feeble comments out of certain staff members of the FRA to effect that the Amtrak trains and their locomotives are as safe as the other locomotives that operate on the territory.

Now the FRA could just as well counsel the Union Pacific Railroad to progressively up grade their locomotives and wayside circuits to bring them up to the level of the majority of the rest of the country, and thus allow for Amtrak to engage the protection of their speed control feature, and more important importance to the UP, to allow them to improve their operations with such features as "cab signals, no wayside signals, code change points" "appropriate speed features when operating over any combination of track turnouts ( 8's, 10's, 15's, 20's, et al), et al. It could have been just as easy to migrate to use of 100 hertz in lieu of sixty hertz, particularly with the merger of the former Chicago & Northwestern. (Of interest for the future, if there is a merger of the UP with a railroad in the east, the package of cab signals will be a major issue, in respect to economic use of power with locomotives assigned of a through cross county manner. It could have been just as easy to convey the 60 million to assist the Union Pacific to up grade their cab signal concepts to more modern technology and gaining additional operating advantages, in doing so.

For a Plaintiffs Attorney, it is not a case that the "FRA knew or should have known"; but rather by the FRA's own rules, it is mandatory to furnish the FRA copies of one's "Railroad Operating Rules" (section 217.7, Part 217, Title 49 CFR). As the FRA justify their existence on the issue of "safety"; how they can digest the Western "Book of Operating Rules" in particular reference to cab signals, when it is there is not any reference to availability of multiple speed or signal aspects ( compatible with corresponding wayside signal aspects -- or to even allow for operation by cab signals with the elimination of wayside intermediate signals). The western Book of Operating Rules is even more onerous when in a foot note it states the locomotive cab signal is not applicable to operation over a track turnout.

Now in sharp contrast, the consolidated "Book of Operating Rules" in the Northeastern part of the United States provides for multiple aspect cab signals, match with wayside (Elimination of intermediate wayside signals if

desired), allowing for a train to immediately improve its speed in conjunction with upgrade of one's cab signal indication (except, pick up from "Restricting" to a more favorable aspect, until having traversed a train length -- the rationale is that if the "Restricting" had been the result of a broken rail, one would want to insure one managed to get the entire train across the broken rail prior to increasing speed). The rules provide for use of an appropriate aspect for the proper speed over a track switch turnout configuration. And most important, one has the speed control overlay feature; which allow the engineman generally only six seconds to apply a service brake application to bring his train down to the speed called for by his cab signal display. The Northeast consolidated book of operating rules allow for implementation of such features as code change points, et all.

Now the FRA have a myriad of field inspectors spread out across the country, and if they are assumed to be qualified; it is obvious there must be a "feed back" to FRA's staff as to the features and advantages associated with "high level" vs "low level" and use of 60 hertz vs 100 hertz and/or some other frequency. (Any electrical engineer would recognize the use of 100 hertz allows for better definition when it comes to providing flat top filters and sorting out code rates. Also significant today is the availability of small package battery to 100 hertz inverters, which precludes need for 100 hertz power lines, now a thing of the past). With use of 100 hertz, not only allows for isolation from the magnetic fields of commercial parallel power lines; but also provides for employing "reverse code" techniques in the track structure, et all.

The FRA are essentially naked in respect to their installation with only a "vision" as to reinventing the wheel when they are unable to demonstrate extending their "visions" known technology over anything other than remote areas free from environmental impact and/or congestion. In contrast, this is quite conspicuous when one realizes some properties have, say replaced obsolete schemes such as inductive train stops with conventional modern continuous multiaspect cab signals for the operating advantages it offered, with no help other than permission to do so, from the FRA.

When the Union Pacific acquired the Chicago North Western with their original General Signal two aspect cab signal package (at least at 100 hertz) the FRA missed the opportunity of say, working through the Surface Transportation Board (STB) to motivate the Union Pacific to start upgrading both the UP and C & N W properties, to more fully develop systems, as have been accomplished on many major properties such as the New York Central, The New York, New Haven & Hartford, , Long Island RR, et all. (This would

seem a more lofty objective for the STB to have adopted, than say, the very large numbers of orders and reports over the years relative to a maze of environmental issues, such as community "noise" as exemplified by all the subsequent outpourings over the years relative to the Conrail - Norfolk Southern -- CSX merger).

The hands of the FRA are also not clean when they set about, and tout installations, as providing for more economic arrangements and improved "safety", with no foggy notion of how this is to be done (as exemplified by expenditure of 60 million dollars and approximately four years plus having elapsed, and now with an additional six months added on to see if one might still reach a successful conclusion. What will the impact of all the fixes and patches do for safety? What happens when the money runs out and there is still work to do?

The FRA have been asleep at the switch, in spite of having two of their representatives on site; of say the Michigan project installed on the Chicago - Detroit Corridor, where in, when one might have cause to abruptly drop a signal to "stop" in the face of an oncoming train, where a hazard is involved, it can take **more than twenty seconds** to cause such a situation to come to the attention of the engineman of the oncoming train; even then on the basis of **contention** (Every thing in all the added steps and systems being required to be working at the time) FRA's Section 236.568, relative to on board the locomotive; but meaningless if one does not, the locomotive **immediately**. The FRA's Rules relate to the statement that cab signal circuits will be interconnected with wayside signals; but obviously FRA and the people out to reinvent the wheel do not recognize the logic and intent of that statement -- maybe we have to add "directly" connected, so that the point is clear to the novice.. The system in Michigan was added as an over-lay on top of the existing signal wayside signal system to provide for Amtrak operation at 90 miles per hour, which even at twenty seconds, the train will be moving some 2400 feet, plus, prior to the engineman even knowing he has a problem or hazard ahead. This is totally unacceptable, when compared to conventional continuous cab signal technology; yet the Michigan concepts involve many of the techniques piked up and proposed to be employed in the NAJPTCD effort.

Congress originally charged the FRA with the responsibility to oversee issues of railroad "safety"; however, in the most recent years they have given away and/or diluted their responsibility by the organization of such groups to advise and guide the FRA such as their "Railway Safety Advisory Committee" structure, made up of representatives, many of which have their own agenda (with no responsibility to a railroads franchise obligation, economic and/or liability).



**Radio Links:**

The NAJPTCP, in their requirements for added wayside radio links to pass information to a central computer processor, as well as other radio links to contact trains as to their locations and provide "authorities" to such trains, as well as dependence upon the Global Positioning System (GPS) for locomotive location information; all in combination, is a classical illustration of placing the operation and integrity of the proposed system for alleged enhanced "safety" in a realm over which the responsible railroad has no control.

The NAJPTCP endeavor as intended to be developed and demonstrated has many added and dependent radio links totally in the realm of "contention" rather than "continuous" (The issue, you want to transmit **now** but do you encounter at that moment some other message from your own network and/or some other transmission or interference from some other source). But the simplicity of a demonstration involving only widely spaced random train movements, is not indication as to the experiential explosive and complexity which would be created by increased territory, trains and other railroads, all of which would raise questions of "contention" and "redundancy" (So much for interoperability).

One only needs to examine the section 2.106 of Part 2, Title 47 CFR (FCC's Table of Frequency Allocations), to note the 900 megahertz radio channels allocated for train to wayside digital communications are closely spaced with other uses in close frequency proximity (A current case of interest, in the same part of the frequency range--Sprint Communications, in this portion of the spectrum for their digital wireless phone service, interfere with mobile data display of and for police vehicles at various parts of the country -- Other wireless companies object to suggestion that Sprint move to a higher part of the frequency spectrum, for that would give them the ability to have more "features" if they had a higher frequency assignment, The other option would be to shift and/or fix the police radio services; but in that case, the issue is hung up on the basis who pays. the costs?

The frequency choice for wayside to central communications, in the section for use of a nonlicensed portion of the radio spectrum, carries the foot note that no protection against interference is to be provided by the FCC. Again this is a question of tests in the sparse territory of Central Illinois as contrasted with more urban areas, coupled with the recognition that contemporary tests of an area does not guarantee immunity against interference from other users (This is an unlicensed slot) at any time in the future.

The recent death of 71 people due to a mid-air collision between a Russian Transport plane and a DHL Jet over southern Germany appears to **have many of the same elements envisioned for application of the NAJPTCP effort.** We have the collision avoidance system of a ground control computer complex at Zurick's Airport out of service for routine maintenance. We have only one operator on duty at the control point. We had seconds (less than a minute) to attempt to notify the Russian Transport Plane of the impending collision by radio instructing the Russian Transport plane to "dive" (The Russian pilot was noted to descend after the second warning). Unknown to the ground controller and/or his computer, the second DHL Cargo Transport was equipped with a collision avoidance radar, which it was understood caused the DHL pilot to also quickly descend in altitude; thus with both aircraft descending at the same time, they impacted in space with destruction of both aircraft and death of all persons aboard.

The dependence of the NAJPTCP endeavor flies in the face of several warning flags related to the use of the Global Positioning System (GPS) to include FRA documentation from their Volpe Center, even contemporary information recently published by the American Society of Civil Engineers (ASCE) as well as the public available telephone GPS status recording.

The Department of Transportation (Which oversees the FRA) as a consequence of a Presidential Decision Directive, tasked the Volpe National Transportation Center to "assess Vulnerability of Transportation Infrastructure Relying on Global Position System". This report in considerable depth slightly over 100 pages in length, was released 10 September 2001 (Contact: Bill Adams DOT 92-01, Tel. (202) 366-5580),

Recognizing railroads operate predominately in valleys in their seeking optimum grades; thus shielding of the low horizon by adjacent hills, places the railroad at a considerably worse advantage in use of GPS as contrasted with say aircraft, or military missiles for which it was originally designed. Over all, the Volpe report is not too favorable.

In a recent issue of the "Civil Engineer" (Publication of the American Society of Civil Engineers, May 2002 issue, page 30) the hazards of buildings, terrain, tree leaves, etc are outlined and the vulnerability of frequency jamming is also added. All told, it is now known that the decision has been made to extend the service life of "Lorraine", and like Federal supported navigational systems for another ten years (Or until the GPS system can be further enhanced to justify limiting other systems of navigation).

Now of the working twenty four satellites in the GPS system, at best, a ground position, over a short period,

sees only two or three satellites. For anyone really interested, a twenty four hour telephone recording is available to identify those individual satellites by their specific identification number, that are currently out of service, or are being reprogrammed (Frequently for two or three days duration; to say, upgrade their internal data, as a consequence of their slowly dropping out of orbit over time).. The "times" given on the recording as "Zulu" are Greenwich Time. One might try 1-703-313-5907 (Check it now and then for over a week). Does the **moving** locomotive know which numbered satellite it is looking for at any specific time, and if so, will it have a telephone to call the recording to see if that specific satellite is out of service??

### **Non-equipped:**

Early on, the NAJPTCP endeavor was to be established in two separate districts, one with a full Centralized Traffic Control scheme (CTC); the other to be dependent entirely upon radio link authorities to the train. Early conclusions as to how a non-equipped train, or one that failed in route was to be handled, were totally unacceptable. To stand the test of interoperability no solution predicated upon "one train at a time" is acceptable. (As a case in point, a few years back, the Long Island Railroad, in the four track stretch "JaY" (Jamaica) and "Harold" (Long Island City), a distance of about eleven miles, elected to install reverse signaling on all four tracks; but omitted the intermediate wayside signals for movements in the reverse direction. If a train lost its cab signal, under the rules it could operate at a reduced speed at 40 mph and not enter an occupied block, and following trains were held. It was not too long before it was realized that the reverse intermediate wayside signals **had to be added** to the layout, due to the congestion caused by a non-equipped train tied up in what were effectively longer blocks in the reverse direction.

A new issue arises -- with the added links and systems, both on the wayside as well as the vehicle as to just what constitutes a failure and how is it identified??

### **Software:**

**For emphasis**, as it applies to software as well: In the overall implementation of a project such as the NAJPTCP effort, the FRA in its most recent publication of the FRA response to computer aided train control devices, repeatably identifies the railroad as the responsible party for all facets of an installation.

As the NAJPTCP effort has its focus on a single main server (computer), for any congestion of traffic, as it might be said that certain traffic will be "prioritized", one is faced with, yet, contention of a multiplicity of traffic with more than one or two train movements wandering

around in the territory. One must recognize that the NAJPTCP is dealing with a complex which functions on a **serial** basis (one step at a time, in sequence) as compared with **parallel** logic flow from say a scheme of relay logic, which is distributed in the field, and functions on a local **vital** basis.

Software today is an ill defined issue and in the interest of identification if the issue, attached as an exhibit 1, is a contemporary news clip "Making software vendors liable for faulty products"

An interesting case a few years back, was the Washington, DC Metro, and caught on tape was the motorman who requested permission in a light snow, to go to manual brake control as he was slipping by stations -- he was refused, and at this time, a train ahead was going into its yard; but stopped on the way into the yard -- . The computer program counted the advance train's "head-end" in; but lost the score of the advance train's "rear end". The following train with its brake problem managed to collide with the uncompleted movement of the train ahead and the **motorman was killed**.

Only a few years back, the California Engineers Registration Board attempted to change the State's Professional Engineer's Registration Law to require that a Professional Engineer sign off on a specific project, where any computer software was involved, that the engineers approval of the project include the supporting software be fully responsible for its behavior. In spite of the issue being raised and defined by the State Engineer REGISTRATION Board, the issue died in the State Legislature; so now, like else where, the integrity and behavior of software continues to be in a "wonder land"

Amtrak's center computer with its control Washington, DC to Trenton, NJ "crashed" at a most inappropriate time 5:42 PM + - , on a Friday evening. For example "SEPTA" commuter operations died, not only for the first hour it took to re-initialize Amtrak's main frame; but it took "SEPTA" another hour to reestablish any semblance of their schedules (as they had to straighten out their crews and equipment)(Such friendly "all news" radio stations did a outstanding job of keeping the public informed such as those waiting at stations to take their mate home for dinner, etc.) The major difference between an Amtrak "crash" of their main frame as contrasted with the "vision" of the NAJPTCP is that all the "safety circuits" are on the field, the links to the computer complex, and the computer, per se, are non vital; and with a qualified person distributed to the various local sites to take over local control and/or place the facility in a "fleeting" mode; thus trains, through movements, are not completely stopped or in danger on such a situation.

One only read and/or subscribe to "Computer World" (P.O. Box 9171; 500 Old Connecticut Path, Framington, MA 01701) the Worlds Technology Newspaper" to find it replete with horror stories of projects of extensive effort and cost only to turn out as failures.9 e.g. "ERP ; excuse us as we digest our new system").

These problems are personal as well - two months ago, in a hospital, for an MRA, solution in my arm - three tries over ½ hour and Doctor reported a "glitch" = you have to get dressed and we will schedule you for another date -- then the trip 8 miles to bank -- sorry, we can not handle your transaction - the computers are down ---.



Belknap Freeman, PE

31 July 2002

*File: Inquirer 16 June 02 Page E3*

# Making software vendors liable for faulty products

By Elinor Mills Abreu  
REUTERS

SAN FRANCISCO — Ralph Nader forced automakers to make safer cars in the 1960s. Now, consumer advocates and others say software vendors should be liable for their faulty products, just as producers of cars and toasters are.

At the crux of this radical proposal, on which potentially billions of dollars in lawsuits could one day rest, is the definition of software itself. Is it a product or a service?

If it were just a simple packaged product, the case might be more open-and-shut. But software vendors have so far persuaded courts that computer code is different from anything else because of its intangible nature and the way it interconnects with other software and systems.

"Software is like Jell-O: When you touch one part of the product, the other part wiggles," said Claude Stern, an attorney with law firm Fenwick & West in Palo Alto, Calif.

Because it is written by programmers and easily modified, and is used in concert with other pieces of software and hard-

ware, it is more like a service, Stern said.

"Toasters are relatively complete in and of themselves, as are tires. Software is not so simple," he added. "People are OK with the fact that software isn't perfect."

Others argue that such contentions enable software-makers to sacrifice quality for the sake of profits.

"Software is not free speech or free expression; it's a product," said Mark Rasch, a computer and Internet lawyer and former head of the U.S. Department of Justice's computer-crime unit.

"Where we've been so far is 'Download or die' — and you take your chances," Rasch said. "As long as software companies are not liable for the damage from their products, they have no incentive to make the product more secure."

Attorneys on both sides of the debate say that there will not be a rush to the courthouse soon and that consumer demand or laws may be necessary to break the legal logjam.

But a recent U.S. government scientific advisory panel took a different view. The National Academy of Sciences issued a re-

port in January urging lawmakers to consider adopting legislation to hold software vendors liable for security breaches.

"Vendors in general have very strong disclaimers saying, 'If you use our product and something bad happens to you, tough,'" said Herb Lin, a senior scientist at the Computer Science and Telecommunications Board of the National Research Council, an arm of the academy. "So, imposing liability would change that."

"Why is software, which is now essential for everyday living, not held to the same standard as cars and children's toys?" attorney David Banisar wrote in SecurityFocus.com.

Unhappy software buyers currently have recourse under existing product-liability law, according to lawyers. However, software vendors successfully limit their liability by including disclaimers in the licenses that users must agree to when installing the software, they said.

If software-makers were held liable, said Marc E. Brown, a partner at the Los Angeles law firm of McDermott, Will & Emery, the cost to consumers would rise dramatically.

Part of FRA Deckel 2002-12113

**Comments as to a Published Article - of June 2002**

Attached to a recent letter from Frank Hertl (Of the Illinois Department of Transportation), his letter of 20 June 2002, was a copy of an article "CBTC will Bring Many Benefits", previously published in the International Railway Journal. Neither the "article" or the letter of transmittal identified the date of publication; however it has now been determined that the "article" appeared in the June 2002, pages 14 & 15 of the Journal. A newer copy is included as Exhibit II, for the benefit of other readers who will be included as "information copies" of my original letter, of which this section is Attachment III.

That which follows are broad comments, not intended to be all inclusive, nor a line by line critique. Prior to embarking on the contents of the "paper", it is felt that neither contributor had any back ground in depth, as to the magnitude of detail and capabilities of modern "off the shelf technology"

It is to be admitted that this writers background is deeply involved with the Northeast, where cab signal concepts involve locomotives and multiple unit suburban vehicles with totals in the thousands. Many of the "CBTC" Cheerleaders, concede that the NAJPTCP effort would not apply in the Northeast, admitting that it would be overwhelmed; however that is just one more example of the touted issue of "Interoperatability". As to the other way around, equipped locomotives of Amtrak, CSX (former Conrail locomotives) as well as Norfolk Southern(former Conrail), operate westward, say to Pittsburgh, with the same facilities, very well, thank you. Prior to the abandonment of the former "Panhandle" of the Pennsylvania, due to the merger and duplication with the New York Central, the conventional multi-aspect continuous cab signal package was in effect to Indianapolis, IN. It might be of interest to note further, when the former New York Central Intermittent Train Stop was removed on the Hudson River route, Multi-aspect continuous cab signal facilities were added from New York up past Albany, NY(Now involving a mixture of Amtrak, CSX and Metro North Commuter trains.

Now with all this being said, the **article:**

The paper has a serious problem of touting various advantages and capabilities, with no explanation or substantiation; which subsequently in the same article are both unsubstantiated and left hanging with admission **we are not there yet"(so how do we know, and/or how can we compare to existing technology which provides the same attributes, if not in a better manner???**

The paper violates a basic premise in merging train control functions on a common "bus" of a computer platform, which in my professional and working back ground, which is

operates in a secure independent world, in a locked cabneted Power Supply" (Section 236.516, Part 236, Title 49 CFR) and "Insulation Resistance Requirements (Section 236.552). One will note in standard practice over the years, that cab signal systems on a locomotive operates in a secure independent world (Locked cabinet) world of its own, with no complications and/or degradation required with the added need to have an "identification", and thus face the added issue of "contention" and prioritization of message to gain access to a common bus, as well as further identification by appropriate box to recognize, interpret and cause a safety function to perform. (Why introduce all the additional steps, when otherwise, one operates in an isolated independent system, with immediate direct results, no extra steps, when a command is required???)

As This writer feels very strongly about this issue, and contrary to the impact and outlook of one of the authors of the "paper", his concerns to keep a locomotive in good shape and capable of doing "its thing", this writer's concern has been the risk of killing someone, and the objective of "zero tollarence of failures". In mid career, with Paul Earley, PE of the maintenance of Equipment Department, and a person out of Transportation - for any report of an incident, that was not identified at Division or Regional Level, when it came to "system", if not settled or something we felt was no complete, as a "system team", we were the last word and did every thing possible to insure we were satisfied with the results. In another case, a manufacturer came out with a new solid state front end cab signal amplifier.--- with a rear end collision of a Conrail operated Multiple Unit train collision into the rear of an Amtrak train which had inadvertently stopped, with the engineman claim he had an Approach in his cab. Working then with Delip Patel, PE, then of Amtrak and Glen Lazor of the FRA (Now deceased) we were able to get it into a state of "self oscillation at will" with values of energy in the track with in the range for which it had been designed, Taking that unit to the manufacturers plant we were able to get any amplifier in their plant to fail the same way. This obviously got the plant managements attention, and then identifying a second design flaw as a possible failure waiting to happen, it was suggested this writer did not know what he was talking about, with the suggestion that I return to Philadelphia.---Obviously, again with the help of Delip Patel, PE and the operating department, we set up a test field and demonstrated the failure mode of that the manufacturer had "Poo - poed" -- obviously the original package was redesigned, and the manufacturer modified every one they originally made, to include all those sold to others and in the field. -- now why this diversion ? To point out my concern, that to have the responsibility, one must know all the details and be able to react accordingly. In that which follows, there is reference to "proprietary software on the locomotive combined package today - bad!



As the NAJPTCP pushes along with the apparent objective to incorporate its locomotive portion of the "safety" requirements into a common processor based platform aboard the locomotive, to include the cab signal package and its control of the brake system, it is obvious that the "papers" actions are pushing the **acceptable state of the art, to include even the FRA's position, to date** which can be stated, for all to read, in the discussion of an earlier Notice of Proposed Rule Making, as stated in part: (10 August 2001, 66FR42360)

..... Cab signals and ATC/ATS appliances have included a separate antenna for interfacing with the track circuit or inductive devices on the wayside. The power supply and control logic for train control have been separate from other locomotive functions, and cab signals have been displayed from a special-purpose unit. Penalty brake applications have been accomplished by direct operation of a valve that accomplishes a service reduction of brake pipe pressure, and the train control system also functions to "knock down" the locomotive's tractive power. In keeping with this physical and functional separation, train control systems on board a locomotive have been considered exclusively within Part 236, rather than the locomotive inspection requirements of part 229.

Onboard locomotives, braking and throttle functions have traditionally worked independently, with discrete mechanical and pneumatic controls. As electronic systems were initially introduced, controls remained separate and distinct. Until recently, electronic controls have been packaged incrementally by various vendors (e.g., speed sensor vendor, brake system vendor, locomotive manufacturer). In locomotives that employ this arrangement, control functions may be distributed among several processors using proprietary software.

----- . ----- . -----  
Locomotive manufacturers are preparing more capable electronic platforms to support locomotive and train control functions, but to date FRA has taken the position that train control functions should remain separate. Historically, and within the context of existing ACS/ATC systems, train control functions have been required to be carried out in a failsafe manner by "vital" systems. Locomotive electronic controls, while designed with a high degree of attention to safety, have thus far not been demonstrated to fail safely with a high degree of reliability, and in individual cases unsafe failures have occurred. In effect, electronic control of locomotive functions has arisen in recent years without regulation, and in some cases products have been deployed prior to adequate analysis and testing. As a result, locomotive engineers have expressed concern regarding the safety characteristics of certain electronic features. Despite the best efforts of OEMs and suppliers, in some cases engineers have been relegated to use of emergency brake valves in the face of blank screens and uncertain availability of normal control functions.

There are several issues involved in attempts to avoid having an isolated, independent cab signal package, to include: That the FRA considered train control systems exclusively in Part 236 rather than Part 229; which brings Section 235.3 (That requires locked signal enclosures) into play, and of major importance -- to fix responsibility (Would you want a member of another craft, for some other purpose, screwing around with the processor based computer and its wiring and inadvertently, or by ignorance, interfere with those facets of the system intended to respond to a "safety issue"?)-- an interesting area by not limiting the scope of the "signal system" on the locomotive; to what extent do you expand the scope of Section 228.5(c)(3)

related to "hours of service" to migrate to other crafts in the M of E Department????

That the cab signal package had institutional background, at least on the former Pennsylvania Railroad, some 2,000 plus steam locomotives had their cab signal control in a rugged steel box with weatherproof doors and fittings, locked, and mounted beside the boiler or in front of the locomotive boiler. For those of us still around from those days of the late 40's to early fifties, when the railroad elected to scrap the steam locomotives and replace them with diesel, will remember that diesel locomotives were ordered with out cab signals, as a program existed to remove the complete package from the steam locomotive to be scrapped, and the cab signal package to be reinstalled on the new diesel locomotives (See attachment IV).

*742* paper introduces the issue of **cost savings**; but recent public pronouncements by George A. Givalla (Assoi. Administrator, FRA's Bureau of Safety) before the RSSI Meeting at Louisville, KY, 21 May 2002, and again at FRA's "RSAC" meeting at Washington, DC, on the 24th of May, 2002; that the FRA will not approve any possible "Positive Train Control" scheme that did not include conventional track circuits (or equal) to detect broken track rail conditions. To require continued use of wayside signal facilities, along with the explosive growth of systems and parts population, defined reduced service life, and added personnel maintenance forces and their support facilities, as envisioned by the NAJPTCP endeavor, **makes a "mockery"** of any vision of reduced costs.

The paper speaks of certain types of train control by various railroads; but loses sight of the reality of "need" in respect to level of traffic vs the cost of and/or any possible advantage that might be gained by the added expense of additional facilities.. **The authors have lost sight of their "vision" for the NAJPTCP concepts are "All or Nothing; as contrasted with** conventional signal facilities - one could provide for simple "automatic Block", then add cab signals, and there is the concept of nine aspect cab signals, then add "Automatic Train Control and Advanced Civil Speed Enforcement Systems (ACSES), all on an incremental basis and as economically justified as a function of traffic and operating benefits to be obtained.

The authors would be well advised to recognize and correlate their thoughts with the reality of "railroad track classes" as dependent upon track geometry, to include such factors as "gage", "alignment", "track surface", etc (Sections 213.9, 213.53, 213.55, 213.63 Part 213, Title 49 CFR) all of which are business decisions as to the extent and need exists, as a function of rail traffic density, tonnage of typical traffic, traffic density, speed of

trains, "class" of trains, et all.

There is a "mind set", that redistribution of tax dollars is available, to stay abreast of "brochures" and the "visions" they extol; a situation that is most prevalent with "transit" as recipients of the Federal Transit Administration (FTA) legacy; but there is a spill over into the expenditures in various directions (e.g. their quest to find a solution to detect broken track rails; today by their funding activities at TCCI, in order to find a solution that would **be cheaper** than the century old simple track circuits -- "Reaching Out For Rail Flaws", Railway age, June 2002, Pages 58-60]--These efforts are humorous; for example, you have a broken rail, welded rail territory, winter, now to expand the rail before welding(to prevent a buckle in summer, do these kids know how and to what extent one would have to heat the rail to close the gap?? And so much for their added appliques.

What the FRA's TCCI efforts projects completely over look are other features gained by use of say coded track circuits; -- such as code for contiguous cab signals, vital code to convey intelligence for successive signal indications, reverse code for traffic locks or release of electric switch locks (Section 236.410, etc) and then there is the issue of rail highway crossing protection, et all.

In the "paper" talking about "Communications Based Train Control" (CBTC), the article touts "...Operational efficiency may be improved via such mechanisms as moving block also known as flexible or dynamic block control for railroad headways..." Such visions introduce new issues, such as the significant issue, how where is the end of train; but then **why bother** as such installations presently exist and are in revenue service (and expanding into other territories) that arrive at the same result.

The authors obviously, when ever they wrote their article, were oblivious to, or did not understand, the "**clear-clear**" concept all ready in revenue service, with all the "vital" features in the field in a simple straight forward manner (Originally laid out in "patent rights" sold to the Union Switch & Signal Company, by two individuals, then employees of the Pennsylvania Railroad, with their managements permission, in the mid 60's - guess who one of them was?), presently involving Amtrak, and now being extended incremently to include territory south of New York. The system employs wayside signals so laid out to compensate for grades and braking distances for conventional trains, and their use and response to continuous four aspect cab signal packages with speed control, for freight, conventional passenger, and commuter trains.

Now for the very high speed passenger train, in the 150 mile per hour category, sees a possible nine aspect

continuous cab signal with its higher speed displays; but such nine aspect display is **not seen by conventional trains** as it is contingent upon use of an additional carrier frequency and codes in combination with the basic codes and their frequency; thus as the basic vehicles only see the original basic code, either train can negotiate the territory without the wayside being concerned as to what category of train is approaching. The display of the higher speed indications is dependent upon their being two or more "clear signals" in succession as required to obtain the adequate braking distances. The added aspects for the high speed train adapt them well to the higher speed track switches in the 70 to 80 mile per mile category (In combination with the nine aspect cab signal, as an "overlay", the territory also includes for civil speed restrictions, employee working restrictions -- consisting of intelligent wayside packages between the rails, with the title "Advanced Civil Speed Enforcement System (ACSES). The locomotive knows where to expect the wayside marker, and if not registered, provides for reduction in speed, etc.

Early on, CBTC was a "buzz word" employed to support the elaborate developments projects on the New York City Transit, Bart, and SEPTA trolley tunnels; all with the objectives touted, for their justification. At the time of the author's article relative to the NAJPTCP effort, those parallel activities were being given extensive publicity in various arenas; now comes SEPTA, as a "Transit Update" with a published article "CBTC; will SEPTA be first??" (Railway Age, June 2002, Page 20, by Tom Sullivan, Consulting Editor). As the article supports, the SEPTA effort has become a total "cop out", as contrasted with the original contract documents; having for example, tossed out any thought of "moving blocks" with substitution of a collection of wayside markers which vehicles will read to determine their location -- the scheme as envisioned will now reduce traffic thruput rather than increase tunnel capacity.

There are many issues not covered by the "article" that are worrisome. For example, under various NAJPTCP concepts of operation, there are many types of computer type intelligence placed upon the locomotive "in route", not validated prior to the locomotive being dispatched. This is in sharp contrast with conventional simple independent systems in use today, where the end of trip test determines if work is required before the next need for the locomotive; in combination with departure test requirement to insure locomotive is "good" for its next assignment (Sections 236.586 and 236.587, Part 236 Title 49 CFR)

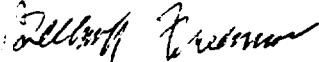
As it is not covered in the "article" it would be of interest to see how the NAJPTCP effort will match its locomotive intelligence with that of the roadway signal system (Section 236.514, Part 236, Title 49 CFR) when it is recognized in the "west" and elsewhere, railroads often

employ "route" signaling indications; while the major properties in the east employ "speed" indications", which thus match the speed indications conveyed by the cab signal on the locomotive.

The integrity of the "article" as late as it was published appears to have failed to recognize its "good feelings" seem to be contradicted by the ultimate delays of the past and new advice of added delay, obviously due to placing "patch upon patch" as ultimate consequence of awareness of required became apparent.

The paper fails to give any credit to those involved in participation of many individuals, who after many hours and repeated conference calls, contributed to the projects not completely going down the tubes.

Over all, it is this writers professional judgement that the "paper" is pure speculation and brochuremanship. It would be of interest if the "authors of the paper" would accept Mr. Frank Hertl's suggestion that I take my concerns of their details of the article to you for a response.



Belknap Freeman, PE  
5 August 2002

# CBTC Will Bring Many Benefits

Communications-based train control systems are currently being developed in North America and Europe to improve safety, operational efficiency, interoperability, and life-cycle cost.

### Alan Polivka

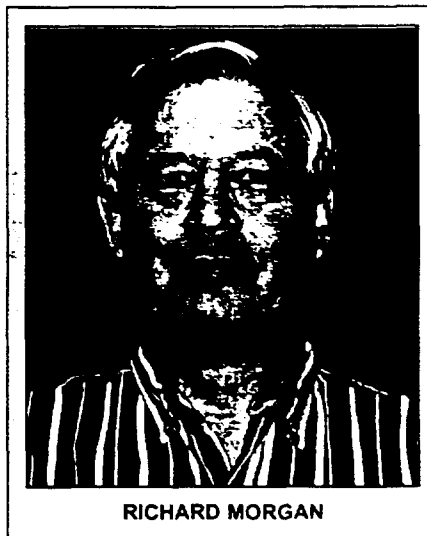
General Manager, NAJPTC project, and Assistant Vice-President of Communications and Train Control Technologies, Transportation Technology Center Inc (TTCI), United States

### Richard Morgan

Manager of the Association of American Railroads' (AAR) Strategic Research Initiative for Train Condition Monitoring, TTCI



ALAN POLIVKA



RICHARD MORGAN

deployed between the control points.

These train control methods are used on the vast majority of railway lines in the world today. They have proven to be safe and reliable over the past century. As technology improves and competition increases, however, there is incentive to develop new train control methods that improve safety, productivity, and cost effectiveness.

Communications-based train control (CBTC) systems will improve safety, operational efficiency, interoperability, and or LCC. Safety is improved primarily by increasing hazard mitigation coverage through automatic onboard warnings and or enforcement to avoid collisions, to prevent excess speed, and to protect track workers.

Operational efficiency may be improved via such mechanisms as moving-block (also

known as flexible or dynamic-block) control for reduced headways, traffic management for dynamic train meet or pass planning on single-track lines and congestion control, and pacing to keep trains in compliance with the movement plan developed by traffic management algorithms. The overall results can be greater traffic throughput and greater average speed, along with improved service reliability and asset utilisation.

Other CBTC benefits can include integration of train defect detectors, constant warning time activation of level crossing warning systems, mixed operation of freight and high-speed passenger trains, and timely precision train location determination and reporting.

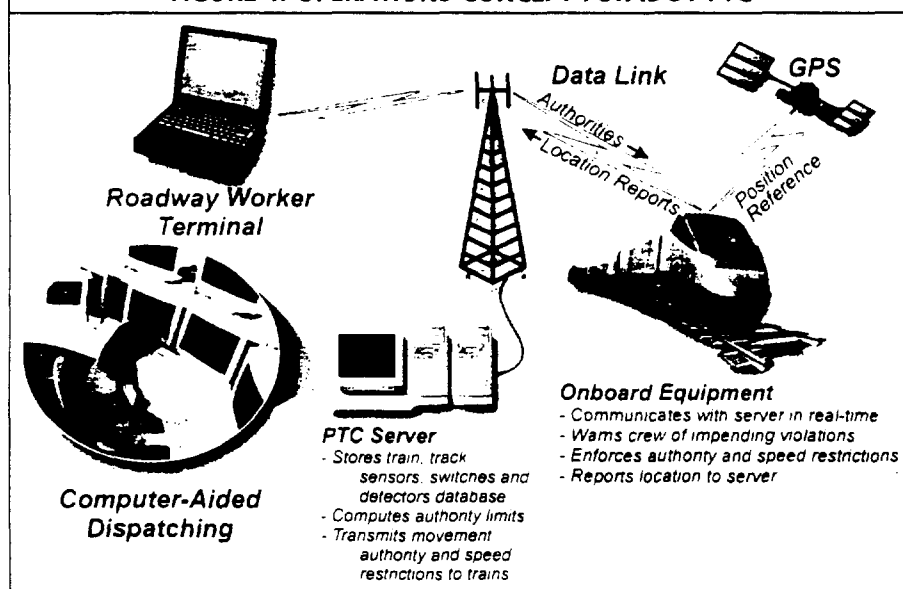
Communication systems such as GSM-R or ATCS-200 mobile data radios are integrated within these control systems, hence

**A**ROUND the globe, radios are now assisting in controlling trains with distributed power, remote control locomotives, and indirectly through code line replacement and pole line replacement. What is more, radios are beginning to play a key role in the next echelon of control with communications-based train control. The potential advantages cannot be ignored: improved safety, operational efficiency, interoperability, and lower life-cycle cost (LCC), just to name a few.

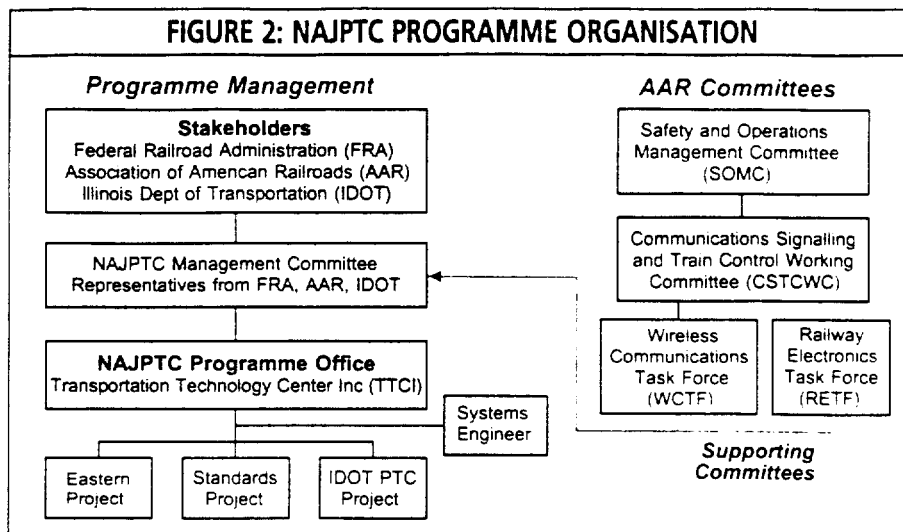
During the past century, train control methods throughout the world generally fell into one of three categories:

- Forms-based train control: movement authorities are issued in increments of predefined blocks or between specifiable limits. Initial authorities and restrictions may be issued on paper with updates relayed via voice radio or telephone.
- Signalling: manual block signals controlled by human operators, typically at each interlocking, or automatic block signals (ABS) controlled by logic, based on train occupancy data as detected via track circuits. Implementation of ABS has evolved from relay-based to microprocessor-based equipment. Signal aspects can be displayed trackside and or in locomotive cabs.
- Centralised Traffic Control (CTC): a more sophisticated signalling method which allows dispatchers in a control centre to direct traffic via remote control of control points in the field, typically associated with interlockings. Automatic block signals are often

FIGURE 1: OPERATIONS CONCEPT FOR IDOT PTC



# Benefits To Operators



the name communications-based train control.

The two most prominent CBTC/traffic management systems being developed today are the European Rail Traffic Management System (ERTMS) and the North American Joint Positive Train Control (NAJPTC) system.

ERTMS consists of the European Train Control System (ETCS), GSM-R, and the European Traffic Management Layer (ETML) system. Train location is determined using track-based Eurobalises. A key objective is to permit interoperability among European countries, within national networks, and between various operating companies. Levels 1 and 2 of ETCS are starting to be deployed in Europe. Level 3 should be well suited for high-density, international main lines in Europe, when it has been developed fully. Variants of ETCS are also being evaluated for use on lower density lines.

The NAJPTC programme is a five-year, \$US 60 million project sponsored by the Federal Railroad Administration (FRA), the Association of American Railroads (AAR), and the Illinois Department of Transportation (IDOT). The project is based on four overall objectives to:

- develop, test, and demonstrate PTC capabilities in a corridor with both freight and passenger services
- meet the safety objectives of avoiding train-to-train collisions, enforcing speed restrictions, including civil restrictions and temporary slow orders, and providing protection for track workers and their equipment operating within limits of their specific authorities
- provide for industry interoperability and demonstrate the safe operation of locomotives equipped with interoperable systems;

the demonstration will address: locomotive human-machine interfaces with a minimum set of standard features, compatible communications interfaces to or from and on board the locomotive, minimum acceptable content and format of databases, and a minimum common set of messages between devices and software objects on board the locomotive, track vehicles, and off-board controllers, and

- provide a cost-effective design to enhance the prospects for deployment.

An overview of the concept of operations (ConOps) appears in Figure 1. Although NAJPTC has many similarities to ETCS, it differs significantly in its location determination technology. NAJPTC is optimised for the vast expanse of the North American railway network with its limited number of tunnels, and provides high integrity train location determination using a GPS/inertial navigation system that eliminates the deployment

and maintenance costs of associated track-based components. One or more central office servers receive location reports from trains and send speed restrictions and incremental movement authorities to trains.

The NAJPTC project consists of three inter-related projects: the Industry Train Control Standards Project, the Eastern PTC Project, and the IDOT PTC Project. They provide input to and accept outputs from each other as they all play critical roles in achieving cost-effective interoperability of PTC systems.

Since wide deployment of PTC systems is

strongly dependent on their being cost-effective, they must be interoperable, modular, and scalable. To ensure this, the Standards Project is developing industry-wide standards for cost-effective, interoperable train control and related systems and devices. The project has developed and published standards, including the draft Train Control Standards Data Dictionary that provides a common, core set of data elements to be used in the development of standards-based train control systems. The data dictionary for example includes more than the data elements for train control. Train control is one application for which these standards are being developed.

The purpose of the Eastern PTC Project was to define an interoperable onboard platform and a standard approach to integrating the platform with various types of train control territories. The project has two phases. During Phase I, an object-based onboard platform that supports interoperable PTC was designed and prototyped. Phase II activities included the development of a specification for objects and messages needed to integrate the onboard platform with non-signalled territory and cab-signal infrastructure.

The objective of the IDOT Project is to develop, test, and demonstrate a revenue service-ready PTC system. This system is being installed on a 193km segment of a mixed passenger freight line belonging to Union Pacific Railroad between Mazonia and Springfield, Illinois. This segment is part of a high-speed passenger corridor designated by IDOT and the FRA between Chicago and St Louis.

On half of the pilot territory, the system

will be integrated with the existing traffic control and signalling systems. On the other half, it will serve as a stand-alone system performing moving block PTC functions.

TTCI, the AAR's subsidiary based in Pueblo, Colorado, serves as the prime

contractor for the NAJPTC programme (Figure 2). TTCI is responsible for overall programme development, management, and administration.

TTCI also supports testing for system component developers. As an example, IDOT's PTC system developer and integrator, Lockheed Martin, recently completed initial operational evaluations of its location determination system at TTCI. Additionally, the communications testbed infrastructure at the Pueblo facility is being upgraded to better support developers of PTC components and systems.

**Communications-based train control systems will improve safety, operational efficiency, interoperability, and/or life-cycle costs**

Part of FRA Docket 2002-12113

**where is this coming from ????**

That this writer is a Professional Engineer licensed in 14 States, and an Electrical Engineer in background, is irrelevant, as contrasted with now over 60 years responsible and hands on experience in the railroad and transit industry, predominately in the employment of a railroad and/or subsequent engineering and design activities.

As background, during World War II, in the service in Panama, England, North Africa, and on to Italy, having been bombed, staffed and shot at, in combination with seeing "death" before my eyes (and a subsequent death years back in the railroad operation) has installed a strong sense of the importance of integrity of systems and their inherent "safety"

As the work on a railroad involved predominately both Signals, Communications, and Electric Traction, to include appropriate impacts on railroad operations of those facilities and systems for which this writer was responsible ;

To monitor ones facilities and how they interfaced with requirements of operations, many thousands of "head end travel", over many divisions was a common practise to evaluate ones position as a "service organization" with the tools to make it better.

Not to be too simple, little occurrences come to mind -- To stop at a dwarf signal buried in the snow, and the crew handing me a broom with the suggestion I go down and brush it off, as I wanted to know what it said as much as they did. An early morning, stopped with a broken air hose, no wrench on the locomotive, and a trip to a farm-house to borrow a wrench, to remove the hose from the front of the locomotive to replace that which was broken -- to be awakened in the middle of the night while in a "Pullman" with the suggestion, we are heading for trouble (severe snow storm), and you might want to get up and get on the engine (Northern Region - Buffalo - of the former PRR).

Extending such brief comments as to this writer's background will indicate why one might feel quite strongly about the pitfalls and impracticable elements being proposed for the NAJPTCP endeavor.

This includes such basic issues such as the "Kiss Principle" (Keep it simple stupid). The railroad environment is far flung and frequently quite sparse, and again this writer experience accentuates the importance of keeping things simple, such that a person, out by himself knowing what has to be done, and capable of doing it can recover sufficiently to accomplish his mission.




The old fable, that goes along: -- For lack of a nail, the shoe was lost, for lack of a shoe, the horse was lost, for loss of the horse, et al; brings one back to World War II again; but still appropriate for a railroad environment:

Landing in North Africa, from England, on the initial invasion, with a Signal Corps Company, designed to support Air Corps complexes; early on we had no "table of Organization Equipment"; and were dependent in part on forage of our surroundings. (It was a challenge - for example "Philips Vacuum Tubes had their pins out three sides; but we could not risk taking one apart; but with knowledge of simple radio receiver and transmitter circuits, we were able to start with basic filament circuits, one was able to identify every thing else - -- the simplicity of spiral four open wire circuits on open wire pole lines between sites was an interesting transition from our earlier practice of transposition arrangement; **but it was simple to figure out**, enabling us to put the facilities to good use in those early days.

In the typical far flung sparse environment such as can be found on a major railroad, in the case of a major disruption; quick recovery is contingent obviously upon having things simple such as forces and materials available can achieve quick recovery; but if unnecessarily too complex, new issues of obsolescence, scarce complex items, lack of local talent, and . or invasion by little tin god bureaucrats who would call a halt to recovery until some one of authority and technical proficiency can "face them down"..

In Attachment III this writer expressed concern with the culture and mind set of Mechanical types whose mind set is to keep a locomotive healthy and able to perform its mission. This is not to be confused with an independent package, where the mission is to provide tools for a safe and enhanced operation; thus the two cultures should not be mixed --- Today, this writer has the advantage of monthly associations with Road Foreman, Chief Engineers, Chief Counsel, Mechanical and other assorted types that it takes to operate a railroad, it being a gathering of some 60 retired management categories from all the railroads in the area (and former roads), all told, a good sounding board to review some of the issues highlighted in these attachments. . Actually, I enjoy a closer relationship, as the member of the preeminent Chester Valley Golf Club (Malvern, PA) have the privilege of being the groups "sponsor" , since the death of Dick Pinkham - the group requires a sponsor for its monthly meetings ,for the benefit of the Clubs Tax Status, and competitive position with other catering organizations)

  
Belknap Freeman, PE  
6 August 2002